

APPENDIX E

HAZARDOUS MATERIALS EVALUATION AND SCREENING LEVEL MODELING ANALYSIS

***PREPARED BY:
TRC LOWNEY***

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Hazardous Materials Evaluation

130-Acre East Sunnyvale ITR Site

Sunnyvale, California

This report has been prepared for:

DAVID J. POWERS & ASSOCIATES

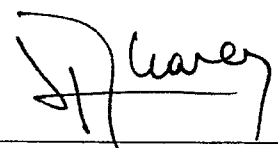
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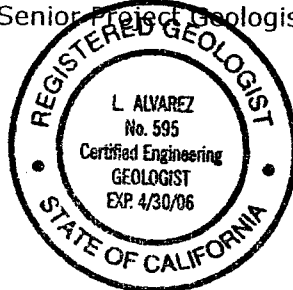
San Jose, California 95126

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Project No. 858-47


for Margo Mackey, R.E.A.
Environmental Consultant


Leonardo Alvarez, P.G., C.E.G.
Senior Project Geologist




Ron L. Helm, C.E.G., R.E.A. II
Senior Principal Geologist
Quality Assurance Reviewer

Mountain View

Fairfield

Fullerton

Oakland

San Ramon

Las Vegas

405 Clyde Avenue

Mountain View, California 94043-2209

Main: 650.967.2365 Fax: 650.967.2785

E-mail: mail@lowney.com <http://www.lowney.com>

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FIGURE 1 — VICINITY MAP

FIGURE 2 — SITE PLAN

FIGURE 3 — STUDY AREA LOCATION MAP

FIGURE 4 — ADDITIONAL SITE FEATURES

FIGURE 5 — OFFSITE AREAS OF CONCERN

APPENDIX A — TERMS AND CONDITIONS

APPENDIX B — AERIAL PHOTOGRAPHS AND TOPOGRAPHIC MAPS

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**HAZARDOUS MATERIALS EVALUATION
130-ACRE EAST SUNNYVALE ITR SITE
SUNNYVALE, CALIFORNIA**

1.0 INTRODUCTION

1.1 Purpose

This hazardous materials evaluation was performed for David J. Powers & Associates who we understand is preparing an Environmental Impact Report (EIR) for the East Sunnyvale Industrial to Residential Project (ITR Site) shown on Figures 1 and 2. The EIR is being prepared for the City of Sunnyvale who is evaluating a General Plan Amendment for the area to change the designation from Industrial with an M-S (Industrial and Service) designation to a designation of ITR that would allow industrial, office, commercial and residential uses. The area would then gradually transition to residential developments.

The purpose of this study was to obtain readily available information on the current and past uses of the ITR Site and on contamination incidents or threats reported at the ITR Site or nearby properties.

1.2 Scope of Work

As requested, the scope of work for this study was performed in general accordance with the American Society for Testing and Materials (ASTM) Designation E 1527-00 as outlined in our agreement dated August 15, 2005. The scope of work included the following tasks.

- Reconnaissance of the ITR Site to observe readily viewable existing conditions from public right-of-ways and a limited drive-by survey of adjacent properties for readily observable indications of current or historic activities that have or could significantly impact the ITR Site.
- Review of readily available topographic maps and reports to evaluate local hydrogeologic conditions including anticipated ground water depth and flow direction.
- Review of readily available topographic maps, aerial photographs, and Sanborn fire insurance maps to evaluate past land uses.
- Acquisition and review of a regulatory agency database report to evaluate potential impacts to the ITR Site from reported contamination incidents at nearby facilities.
- Review ITR Site-specific information on the status of adjacent Superfund sites investigations and remediation through a cursory review of readily available files from the Regional Water Quality Control Board (RWQCB) to evaluate the extent of the potential impact to the ITR Site and to provide recommendations on possible mitigation measures to address potential environmental issues identified during this study.

Our scope of services did not include sampling or analysis of building materials, air, soil, or ground water on the ITR Site. The limitations of this hazardous materials evaluation are presented in Section 7.0; the terms and conditions of our agreement are presented in Appendix A.

2.0 SITE RECONNAISSANCE

2.1 Site Location

The approximately 130-acre ITR Site is located in the eastern portion of Sunnyvale, California in an industrial and residential area. It is generally bounded by East Duane Avenue on the north, Stewart Drive on the south, Wolfe Road on the west and Stewart Drive and Lawrence Expressway on the east in Sunnyvale, California as shown on Figure 1.

2.2 Topographic Features and Hydrogeology

Based on U.S. Geological Survey (USGS) topographic maps, the ITR Site's elevation is between approximately 35 and 50 feet above mean sea level. The ITR Site is relatively flat and slopes gently downward to the north-northeast towards the San Francisco Bay. Based on readily available file information reviewed at the RWQCB for Superfund sites on the ITR Site and nearby Superfund sites (see Section 4.2), the ground water flow direction beneath the ITR Site is generally towards the north to northeast in the A-, B1- and B2-zone aquifers. The unconfined shallow A-zone aquifer is generally encountered at an approximate depth of 5 to 20 feet below ground surface (bgs). The confined B1 and B2 aquifers are generally encountered at approximate depths between 20 and 45 feet, and 45 to 60 feet, respectively.

2.3 Site Visit

Our representative, Margo Mackey, R.E.A., visited the ITR Site on January 18, 2006 to observe readily viewable site conditions from public right-of-ways. At the time of our ITR Site visit, the subject property was developed with industrial and commercial buildings with associated parking lots, a grass field and landscaped areas and roadways. During the ITR Site visit, the current land use and facilities that appeared likely to use, handle, or store significant quantities of hazardous materials based on outdoor storage of materials and posted hazardous material placards were noted.

There are at least 30 buildings currently present on the ITR Site; some of those buildings were multi-story. The interior areas of the buildings were not observed during this evaluation. However, it is likely that fluorescent lights are present in on-site buildings, that on-site buildings with loading docks may have hydraulic lifts, and that elevators are likely present in buildings that contain more than one story.

Pad-mounted transformers were observed outside many of the buildings throughout the ITR Site. An inventory of these transformers was not conducted as part of this evaluation. Pad-mounted transformers in the City of Sunnyvale are typically owned by Pacific Gas & Electric.

The readily observable facility uses noted at the ITR Site are listed in Table 1, and the locations of these facilities are shown on Figure 2. Table 1 also includes information about reported hazardous material use information at these facilities, which was

obtained from government databases (EDR 2006) and file reviews at regulatory agencies.

There are two reported facilities on the Superfund list at the west end of the ITR Site, AMD at 915 Deguigne Drive and TRW at 825 Stewart Drive, as described below and as shown on Figures 2 and 3. There reportedly are over 100 ground water monitoring wells, 32 ground water extractions wells and three facilities with ongoing remediation systems located at the ITR Site as ground water in this area is impacted with VOCs from on-ITR Site and off-ITR Site releases. Locations of facilities with remedial systems and locations of extraction wells are shown on Figure 4.

Table 1. ITR Site Facility and Reported Hazardous Material Use

Facility Number and Name	Address	ITR Site Drive-by Observations	Reported Hazardous Material User-Facility Name	Reported Release - Comments
1A – several tenants	1050 E. Duane Avenue	Office/R&D building with roll-up doors in back	Yes – Technical Finishing Inc. (SQG with no violations listed); Alcatel Vacuum Products Inc. (four records of off-site waste disposal)	Yes – Old Plating Company, (see Section 4.1.1).
1B – office building – no name visible from street	1095 E. Duane Avenue	office building	No	No
1C – several tenants	1031 E. Duane Avenue	office/R&D building with roll-up doors in back	Yes – Metelics Corp (SQG with no violations listed); Alternator Starter Exchange (two records of off-site waste disposal)	No
1D – several tenants	1030 Duane Avenue	Office bldg/R&D with roll-up doors in back	No	No
1E – Horiba Instruments	1080 E. Duane Avenue	office/R&D bldg	Yes – Horiba-Stec Inc. (four records of off-site waste disposal)	No
2 and 3 - Advance Micro Devices (formerly AT&T at 1090 E. Duane Ave [EKI, 2004])	1 AMD Place	Large office/R&D bldg - also includes 13-acre grass field	Yes – Advanced Micro Devices (11 records of off-site waste disposal)	No - Four ground water extraction wells present at the southeast corner of this facility (see Figure 4) related to off-ITR Site VOC releases, (see Section 4.2.2).

(continued)

Table 1. ITR Site Facility and Reported Hazardous Material Use

Facility Number and Name	Address	ITR Site Drive-by Observations	Reported Hazardous Material User-Facility Name	Reported Release – Comments
4 - Trimble	995 Stewart Drive	Office bldg/possible R&D use	No	No
4A - Omneon Video Networks	965 Stewart Drive	Office bldg/possible R&D use	No	No
4B - Intertrust	955 Stewart Drive	Office bldg/possible R&D use	Yes - Pacific Bell (SQG with no violations, five records of off-site waste disposal)	No
4C - Modulus Video Inc.	985 Stewart Drive	Office bldg/possible R&D use	Yes - Vantis Corporation (three records of off-site waste disposal)	No
4D - Metelics	975 Stewart Drive	Office bldg/possible R&D use	Yes - Metelics Corporation (LQG with 1 corrected violation, 213 records of off-site waste disposal)	No
5 - vacant (former AMD based on old signs in parking lot)	950 Deguigne Drive	Office bldg. possible R&D use	Yes - Signetics (SQG with no violations)	No
5A - vacant (former AMD based on old signs in parking lot)	930 Deguigne Drive	Office bldg. possible R&D use	No	No
5B - vacant (former AMD based on old signs in parking lot)	920 Deguigne Drive	Office bldg possible R&D use	No	No
6 - Trimble	510 Deguigne Drive	Office bldg. possible R&D use	No	No
6A - Trimble	935 Stewart Drive	Office bldg possible R&D use	No	No

(continued)

Table 1. ITR Site Facility and Reported Hazardous Material Use

Facility Number and Name	Address	ITR Site Drive-by Observations	Reported Hazardous Material User-Facility Name	Reported Release - Comments
6B – Vitria Technology Inc.	945 Stewart Drive	Office bldg possible R&D use	No	No
7 – MCT, delicatessen and fitness center	845 Stewart Drive	Multi-tenant bldg.	Yes – Modcol, Suite C (two records of off-site waste disposal)	No
8 – Stream Processors, Inc., Sky Stream Networks, Open Silicon	455 Deguigne Drive	Office bldg possible R&D use	Yes – Lambda Advanced Analog (one record of off-site waste disposal)	No
9 – CM Ings and partially vacant	835 Stewart Drive	Small bldg / possible R&D use	No	No
10 – Vacant building (formerly TRW Inc.)	825 Stewart Drive	Vacant building – parking lot fenced off limiting access, no visible signage	Yes – TRW, Inc. (generator of waste) SCR-FEI (TRW) (3 records of off-site waste disposal)	Yes - TRW, Inc. on NPL list. Remediation and monitoring on-going, (see Figure 4 and Sections 4.1.1 and 4.2.5).
11 – Vacant building (formerly occupied by Phillips Semiconductors, aka Signetics [Northrop Grumman 2004])	815 Stewart Drive	Vacant building and fenced off – no visible name or address – debris piled around north exterior area (behind the bldg)	No	No

(continued)

Table 1. ITR Site Facility and Reported Hazardous Material Use

Facility Number and Name	Address	ITR Site Drive-by Observations	Reported Hazardous Material User-Facility Name	Reported Release - Comments
12 - Play N Plug Real Estate (formerly occupied by Phillips Semiconductors, aka Signetics [Northrop Grumman 2004])	440 N. Wolfe Road	Office building	Yes - Phillips Semiconductors/ Signetics (large quantity waste generator and 68 records of off-site waste disposal)	Yes - release associated with former diesel LUST with only soil impacted and case closed. Ground water extraction system and monitoring wells present related to off-site VOC releases from south adjoining property at 811 E. Arques, (see Figure 4 and Sections 4.1.1, 4.1.3 and 4.2.7).
12a - PG&E substation	No address observed during site visit	Substation	No	No
13 - Spansion/ Advanced Micro Devices, Inc. (AMD)	915 Deguigne Drive	2 buildings: office /electronics R&D/mfg. Large ASTs behind bldg, treatment system in parking lot, emissions from stacks on roof.	Yes - AMD (large quantity waste generator, and 366 records of off-site waste disposal)	Yes - AMD on NPL list. Remediation and ground water monitoring on-going, (see Figure 4 and Sections 4.1.1 and 4.2.4).
14 - AMD	943 Deguigne Drive	Small bldg with placards visible	Listed for two hazardous material release incidents - no further work required.	Yes - release reported for this address (see box to the left) but no further work required related to those releases.
15 - AMD	936 E. Duane Avenue	Small building with placards visible	Yes - AMD (one record of off-site waste disposal)	No

(continued)

Table 1. ITR Site Facility and Reported Hazardous Material Use

Facility Number and Name	Address	ITR Site Drive-by Observations	Reported Hazardous Material User-Facility Name	Reported Release – Comments
16 – vacant (former service station)	920 E. Duane Avenue	Vacant service station building with signage "Jim's Service Station"	Yes – Exxon/Jim's Exxon – underground gasoline and waste oil storage tanks. Two records of off-site waste disposal.	Yes - Jim's Service. Case closure granted and no additional work has been required, (see Sections 4.1.1 and 5.0).

2.4 Site Vicinity Drive-By Survey

To evaluate adjacent land use, we performed a limited drive-by survey. Our observations are presented in Table 2 and locations are shown on Figure 2.

Table 2. Adjacent Properties

Business Name and Address	Direction from Site	Observations
A. Rainbow Montessori School: 790 E. Duane B. Kings Academy Jr/High School C. Fair Oaks Park D. Fair Oaks Skate Park	West	Park and schools. No significant hazardous material users observed.
E. Apartment building F. Under construction with Lowe's Store (formerly Signetics, 811 E. Arques St.) G. Tara Com, Zazu Networks, Neturity, CEO Bus Center, 830 Stewart Dr. H. Accounting firm, 846-848 Stewart Dr; Seminary, 850 Stewart Dr. I. Faraday, 490 Deguigne Dr. J. Office bldg., 920 Stewart Dr. K. Xigso Systems, no address visible L. Shoretel, 960 Stewart Dr. M. AC Technologies, 1004 Stewart Dr./Quickturn Mfg, 1010 Stewart Dr. N. Partially vacant, no signage, 1012 & 1020 Stewart Dr. O. I-Base, 1050 Stewart Dr.	South	Commercial and R&D/light industrial. Signetics at 811 E. Arques was an electronic manufacturer with reported releases of solvents impacting ground water beneath the ITR Site, (see Section 4.1.3 and 4.2.7).

Table 2. Adjacent Properties

Business Name and Address	Direction from Site	Observations
P. Shugart Storage, 1060 Stewart Dr. Q. Residence Inn, 1080 Stewart Dr. R. Office bldg. 595 Lawrence Expressway – formerly addressed at 1098 E. Duane and occupied by Arco S. Chevron Service Station, 1097 E. Duane T. Apartment building	East	Commercial and residential. The current and former adjoining service stations listed as having received regulatory agency case closure in 1995 and 1996, (see Section 4.1.3). Impacted ground water from Chevron site appears to be impacting ground water beneath the northeast end of the ITR Site, (see Section 5.0).
U. Residential V. Fair Oaks Plaza: 903 E. Duane Avenue occupied by a dental office, Everybody's Cleaners (903A E. Duane Avenue), restaurant, and a grocery store. The American Gourmet restaurant: 929 E. Duane Avenue	North	Residential and commercial. Dry cleaner is not listed with a release of hazardous materials; it is located down-gradient of ITR Site.

In addition, there are two Superfund facilities located approximately 1/8-mile south of the ITR Site: Advanced Micro Devices at 901 Thompson Place, and Monolithic Memories at 1165 E. Arques Avenue (also referred to as AMD, Subunit 2 of Operating Unit 1 [OU1]). The locations of these sites are shown on Figure 3 and are discussed in Section 4.1.2.

3.0 HISTORICAL REVIEW

3.1 Photograph and Map Review

To evaluate the ITR Site history, we reviewed:

- Aerial photographs (dated 1939, 1948, 1956, 1963, 1965, 1974, 1981, 1991, and 2004) from the USGS Library in Menlo Park, California.
- USGS 7.5-minute topographic maps (1920, 1939, 1948, 1953, 1961, 1968, 1973, 1980, 1991 and 1997) from EDR in Milford, Connecticut.
- Historic Sanborn fire insurance maps were requested from EDR in Milford, Connecticut. However, no Sanborn maps were available.

The above maps and photographs commonly provide historical information regarding a site including land uses and changes in development over time. Copies of these maps and photographs are presented in Appendix B. The following is a summary of our observations for the ITR Site and vicinity.

3.1.1 Site

1920: The topographic map dated 1920 shows the ITR Site with no structures or land features. A road resembling Duane Avenue is present to the north of the ITR Site. Stewart Drive and Deguigne Drive are not present. It should be noted that this topographic map does not include the eastern 1/5 of the ITR Site.

1939, 1948, 1953, and 1956: The aerial photographs during this period show the ITR Site in agricultural use with fields of row crops. In 1939, the ITR Site was entirely covered with various cultivated fields with no structures. In 1948, there was one small residential sized structure at the northeast end of the ITR Site along E. Duane Avenue, and by 1956 there were a few additional small structures at that location. The western end of the ITR Site is not included on the aerial photographs dated 1939 and 1956 but was included on topographic maps during this period.

1961, 1963, and 1965: The topographic map dated 1961 shows a road similar to Deguigne Drive crossing the ITR Site in a north-south direction, two small structures on the east and west sides of Deguigne Drive at E. Duane Avenue, five small residential-sized structures and three sheds/barns on the northeast corner of the ITR Site with remaining areas shown with no structures. The 1963 and 1965 aerial photographs show the ITR Site mostly covered with cultivated fields, except where structures are present as shown on the 1961 topographic map. Three additional medium sized structures are shown east of Deguigne Drive along the southern property boundary. By 1965, East Duane Avenue was realigned at the northeast corner of the ITR Site, Duane Court is shown in its current configuration, and a small portion of Stewart Drive is evident extending a short distance east from Deguigne Drive adjacent and south of the three medium structures. A rectangular area with some grading or disturbed areas is present at the northwest portion along E. Duane Avenue in 1963 and was no longer evident in 1965.

1968: A topographic map dated 1968 shows the ITR Site developed with roadways in their current configurations, except that AMD Place currently located on the eastern end of the ITR Site has not been constructed. Two additional medium-sized buildings are shown; one at the current location of 815 Stewart Drive on the western portion of the ITR Site, and the other near 930-950 Deguigne Drive at the center of the ITR Site.

1973 and 1974: The topographic map dated 1973 and aerial photograph dated 1974 shows the ITR Site with increased development on the western half with medium-sized structures and associated asphalt paved parking lots. The majority of the eastern half of the ITR Site is covered with a low growing grass field, except at the northeast corner which has been redeveloped with five medium sized structures in the same configuration as today.

1981: The aerial photograph dated 1981 shows the ITR Site with increased development of buildings and associated asphalt paved parking lots on the eastern half. The ITR Site looks similar to today and is developed with medium to large sized buildings and asphalt paved parking lots, and a large grass field at the northeast-central portion. Most of the buildings are in their current configurations, except for the complex at 915 Deguigne Drive which has one less building than today, the complex at the northeast corner of Deguigne and Stewart Drive where the buildings are in a different configuration than today, and at 1 AMD Place, where the smaller of the two buildings currently located there is not present.

1991 through 2004: The topographic maps and aerial photographs during this period show the ITR Site developed with structures, parking lots, roadways and a grass field similar to today.

3.1.2 Site Vicinity

1920: The topographic map dated 1920 shows a road similar to E. Duane Avenue present to the north of the ITR Site with a few residential sized structures on the north and adjacent to the road with remaining areas shown with no structures or roadways.

1939 through 1953: The aerial photograph dated 1939 shows the ITR Site vicinity in agricultural use with cultivated fields and orchards; clusters of what appeared to be agricultural buildings were present to the north, east and southwest.

1961 through 1974: The topographic maps and aerial photographs during this period show residential development to the north and west, and structures labeled "Sunnyvale High School" shown on the adjoining property to the northwest at the current location of the Montessori and King's Academy school buildings. In addition, there is a commercial sized structure on the adjoining property to the north, at the current location of the Fair Oaks Plaza. Adjoining property to the south shows increased development during this period with medium to large industrial sized buildings.

1980 through 2004: The topographic maps and aerial photographs during this period show the ITR Site vicinity developed with structures and roadways similar to today, with residential property to the north, schools and a park to the west, industrial/R&D buildings to the south, and commercial buildings to the east.

4.0 REGULATORY RECORDS

4.1 Regulatory Agency Database Report

During this study, a regulatory agency database report was obtained and reviewed to help establish whether contamination incidents have been reported at the ITR Site and in the ITR Site vicinity. A list of the database sources reviewed, a detailed description of the sources, and a radius map indicating the location of the reported facilities relative to the ITR Site are presented in Appendix D.

4.1.1 On-Site Reported Hazardous Material Releases

The ITR Site was listed on several databases reviewed. Sixteen facilities within the ITR Site were listed as hazardous material users as shown in column 4 of Table 1. Six of those reported hazardous material users were also listed having a release of hazardous materials, including two National Priority List (NPL/Superfund) facilities. These reported releases are summarized below:

- TRW, Inc. at 825 Stewart Drive, located on the southwestern portion of the ITR Site, was listed on the following databases: CERCLIS, RCRA-SQG, Finds, NPL, and ROD. This facility was operated by a semiconductor/microprocessor manufacturer; the building was vacant at the time of the site visit. In 1983 trichloroethylene (TCE), dichlorobenzene, tetrachloroethylene (PCE), acetone, n-butyl acetate and xylenes were detected in ground water monitoring wells at this facility. In 1983 an underground storage solvent tank was removed and impacted soils were transported off-site for disposal. The RWQCB issued Cleanup and Abatement Orders to this facility to clean up impacted ground

water. Beginning in 1985, under RWQCB supervision, TRW began operating a ground water pump and treat system and installed a ground water monitoring well network. In addition, the RWQCB required that TRW and two other facilities jointly develop a plan to remediate ground water affected by hazardous materials releases from these three facilities. The other two facilities are Signetics at 440 N. Wolfe Road, which is located on the ITR Site, and the nearby and off-site Advanced Micro Devices facility at 901 Thompson Place. These three companies formed a group known as The Companies to clean up the commingled ground water contamination. Additional information obtained from the RWQCB is discussed in Section 4.2.5.

- Phillips Semiconductors (also referred to as Signetics) at 440 N. Wolfe Road, located on the southwest end of the ITR Site, was listed on the following databases: FINDS, HAZNET, (Leaking Underground Storage Tank (LUST), RCRA-LQG, CA FID UST, HIST LUST, CLEANERS, EMI, and SWEEPS. This facility is currently occupied by an office building. The Signetics facility was listed as having had four underground tanks, three listed as containing diesel fuel and the contents of the fourth UST was not listed. The LUST database reports that soil was impacted by diesel and that the case was closed in 1995. The CA Cleaners database lists dry cleaning related facilities based on SIC code and lists Philips Semiconductors with four records created in 1982 with SIC codes for dry cleaning plants, laundry and garment services, power laundries, and garment pressing and agents for laundries and drycleaners. This facility was listed as a large quantity generator of hazardous waste and had 68 records of disposal for hazardous waste. Additional information obtained from the RWQCB is discussed in Section 4.2.7.
- Advanced Micro Devices Inc. (AMD) at 915 Deguigne Drive, located at the northwestern portion of the ITR Site, was listed on the following databases: Cal-Sites, CERCLIS, FINDS, HAZNET, NPL, RCRA-LQG, TRIS, ROD, HIST UST, and EMI. This facility was occupied by AMD at the time of the site visit. This company reportedly manufactures semiconductor/microprocessor devices. This facility covers approximately 5½ acres, and the building was constructed in 1973. Reportedly, twelve USTs at this facility were used to store "waste", and one was used to store "product". Underground waste solvent storage tanks were reported. In 1981 trichlorobenzene was detected in ground water monitoring wells installed near the building. Other solvents, including trichloroethylene, were detected in on-site soils. According to the RWQCB, soil was impacted from leaking tanks and spills during the handling of solvents. In 1982 three USTs were removed and impacted soil was excavated and transported off-site for disposal. Impacted ground water from this property has reportedly commingled with impacted ground water from three other nearby release facilities, known as The Companies (see above bullets). Since late 1982, AMD and Signetics have operated a pump and treat system located at the 915 Deguigne Drive property to remediate ground water. In 1984, the RWQCB issued a Cleanup and Abatement Order that required AMD, Signetics and TRW to develop a joint plan to attempt to prevent further migration of impacted ground water. Additional information obtained from the RWQCB is discussed in Section 4.2.4.
- 943 Deguigne Drive, located midway along the northern portion of the ITR Site, was listed on the HMIRS and CHMIRS databases due to a reported release of 26 to 75 gallons of hydrochloric acid in 1999. One database reported a release of 75 gallons of hydrochloric acid solution and the other

database reported a release of 26 gallons of hydrochloric acid. The release reportedly occurred due to a leaking drum on a flatbed truck, and AMD's emergency response team responded. The substance was reportedly confined to the truck and area underneath the truck. During the current ITR Site visit, the building at this address was occupied by AMD.

- Jim's Exxon at 920 E. Duane Avenue, located midway along the northern boundary of the ITR Site, was listed on the following databases: HIST UST, LUST, CA FID UST, HIST LUST, SWEEPS UST, CORTESE, HAZNET and HIST LUST. The former service station building at this location was vacant at the time of the site visit and reportedly had two fuel USTs and one waste oil UST. This facility is listed as having had a release of gasoline and MTBE that impacted ground water. MTBE was detected in ground water at concentrations up to 5 ppb. This facility received case closure status in 1998. Additional information about this facility was provided in a previous report and is discussed in Section 5.0.
- The building at 1050 East Duane Avenue, located at the northeast corner of the ITR Site, was listed on the RCRA-SQG and FINDS databases as Technical Finishing Inc., at 1050 E. Duane Avenue, Suite A; on the ERNS database as 1050 E. Duane (Old Plating Company); and on the HAZNET database as Alcatel Vacuum Products Inc., 1050 E. Duane Avenue, Suite E. Technical Finishing Inc. was listed as a small quantity generator of hazardous waste with no violations found and Alcatel Vacuum Products was listed as having four records of waste disposal. Based on this information, neither of these facilities was listed as releasing hazardous materials. 1050 East Duane (Old Plating Company) was listed on the ERNS database due to a release of 10 gallons of waste nitric acid and 10 gallons of waste sulfuric acid on May 16, 1992. Additional information about this facility was provided in a previous report (Shaw Environmental, 2005) and is discussed in Section 5.0.

The following facilities were listed with addresses that are within the ITR Site boundaries, although no structures with these addresses were observed during the site visit.

- 913 Deguigne Drive, which would be located adjacent to the AMD building at 915 Deguigne Drive at the northwest portion of the ITR Site. This address was listed on the CHMIRS and ERNS databases due to a release of an unknown quantity of "hydrochloric and" when the gas scrubbers backed-up due to a power failure. No action was taken, and the gas reportedly dissipated.
- Signetics Corporation at 897 Stewart Drive, which would be located at the northeast corner of Deguigne Drive and Stewart Drive near the center of the ITR Site along the southern boundary. Two buildings in different configurations than today were observed at this location in aerial photographs dated 1965 through 1991, and it is possible that this address was associated with a former building at that location. This facility was listed as a hazardous waste generator and as a CERCLIS facility with no further remedial action planned after a preliminary assessment was completed in 1987.

4.1.2 Vicinity NPL Facilities

Two NPL facilities were identified up-gradient (in terms of ground water flow) and within ¼-mile of the ITR Site and a third NPL facility was identified up-gradient and approximately ½-mile from the ITR Site. The NPL facilities were reported to be AMD at 901 Thompson Place, located approximately 1/8-mile south of the western end of the ITR Site, Monolithic Memories (also referred to as AMD at Subunit 2 of OU1) at 1165 East Arques Avenue, located about 1/8-mile south of the eastern end of the ITR Site, and National Semiconductor at 2900 Semiconductor Drive in Santa Clara, located about ½-mile south of the eastern portion of the ITR Site. The locations of these facilities are shown on Figure 3.

The AMD facility at 901 Thompson Place occupies approximately six acres. An electronic equipment manufacturing facility, AMD has had reported releases of solvents to ground water (UST releases). Compounds including 1,1,2-trichloroethylene (TCE), dichloroethylene (DCE), and Freon-113 have been detected on this property. Impacted ground water from the 901 Thompson Place facility has commingled with releases from three other facilities; AMD at 915 Deguigne Drive (on the ITR Site), TRW at 825 Stewart Drive (on the ITR Site), and the former Signetics facilities at 440 Wolfe Road (on the ITR Site) and at 811 E. Arques (adjoining the ITR Site). Chlorodifluoromethane, acetone, TCE, ethylbenzene, 1,1,1-trichloroethane (TCA), xylenes, dichlorobenzene, DCE, PCE, and trichlorobenzene have been detected in ground water on these properties and in a down-gradient direction (north-northeast). Ground water remediation, including extraction and treatment of ground water and anaerobic bioremediation is reportedly on-going in this vicinity.

Ground water down-gradient from the Monolithic Memories facility, also referred to as AMD at Subunit 2 of OU1, reportedly has been impacted by solvents from leaking USTs. Ethylbenzene, xylenes, acetone, chlorobenzene, chloroform, dichlorobenzene, PCE and TCE have been detected. Ground water extraction and treatment is currently on-going.

The National Semiconductor facility is an electronic equipment manufacturer that occupies approximately 50 acres. Ground water reportedly has been impacted with solvents from leaking tanks at this facility and has impacted ground water down-gradient of this facility to the north-northeast. Ground water extraction and treatment is currently on-going in this vicinity.

4.1.3 Other Vicinity Reported Hazardous Materials Releases

Other nearby reported hazardous materials spills and releases considered to have a moderate or high potential to impact the ITR Site are presented in Table 3. The potential for ITR Site impact was evaluated based on information in the database records regarding the type of release, current case status, and distance and direction (up- or cross-gradient) from the ITR Site.

Table 3. Nearby Reported Hazardous Materials Spills and Releases

Facility	Map ID No.	Address	Distance and Direction From ITR Site	Remarks
Mobil/The Car Spa	18, 19	1097 E. Duane Avenue	Adjoining southeast	Listed on the LUST, UST, Cortese, HIST LUST, HAZNET databases due to underground storage tanks and a release of gasoline to ground water in 1985. Ground water was pumped and treated and this facility received case closure in 1995. This property is currently operating as a Chevron service station. Further information about this facility is summarized in Section 5.0.
Arco	19	1098 E. Duane Avenue	Across the street adjoining at southeast end of ITR Site	Former service station that has been redeveloped with an office building at 595 Lawrence Expwy. Listed as a LUST site with ground water impacted by gasoline and up to 8 ppb MTBE. Case closure date of 1996.
Sobrato Development/ SCR-Stewart Dr. OU, SUB2	37	968/970 Stewart Drive	1/8-mile south	Listed on the SLIC, HAZNET, Cortese, and REF databases with Sobrato Development Company listed as the responsible party. Volatile organic compounds (VOCs) including benzene, methylene chloride, PCE, TCE and toluene detected in soil and VOCs (not specified) detected in ground water at this facility – possibly from an up-gradient source. Further information on this facility is summarized in section 4.2.1.

(continued)

Table 3. Nearby Reported Hazardous Materials Spills and Releases
(continued)

Facility	Map ID No.	Address	Distance and Direction From ITR Site	Remarks
Philips Semiconductors (formerly Signetics)	59	811 Arques Avenue	Across Stewart Drive and adjoining at western end of the ITR Site	Listed on the CERCLIS, FINDS, HAZNET, RCRA-LQG, RCRA-TSDF, CORRACTS, ROD, HIST LUST, CLEANERS, EMI, US ENG. CONTROLS, LUST, HIST UST, CA WDS and CA SLIC databases. Philips, aka Signetics, operated an electronics manufacturing facility at this location. It is under construction for a future Lowe's store. Soil and ground water reportedly impacted with TCE, TCA, DCE, toluene, methylene chloride and benzene. Signetics Corp. is listed as the responsible party. The facility status is listed as remedial action underway. RWQCB is the lead agency. Further information on this facility is summarized in section 4.2.7.
Hewlett Packard Data Terminals Div./Fairchild Semiconductor Corp./Stonehard Inc. Applied Materials/Applied Materials	62	974 E. Arques Avenue	¼-mile south	Listed on the RCRA-SQG, FINDS, HAZNET, RCRA-TSDR, SLIC, CORRACTS, CERC-NFRAP, HIST UST, CA WDS, REF and SWEEPS UST databases. Volatile organic compounds (TCE) released to ground water with migration of impacted ground water reportedly controlled. This facility is up-gradient of the Stewart Drive Operating Unit (SDOU) as shown on Figure 3 and discussed in Section 4.2.1 and 4.2.2.

(continued)

Table 3. Nearby Reported Hazardous Materials Spills and Releases
(continued)

Facility	Map ID No.	Address	Distance and Direction From ITR Site	Remarks
Arques Corporation	64	999 E. Arques Avenue	¼-mile south	Listed on the SLIC, CERCLIS, RCRA-SQG, FINDS, HIST UST, SWEEPS UST and REF databases. Three USTs (two fuel and one waste oil). TCE in ground water at 200,000 ppb. Other contaminants reported to be in soil and ground water. Facility status is "remedial action underway". Further information on this facility is summarized in section 4.2.1.
SCR-Steward Dr. OU, Subun/Robert Wise/CAE-LINK Flight Simulation	65	1077 Arques Avenue	¼-mile south	Listed on the Cortese, HAZNET, SLIC, EMI, CA WDS, RCRA-SQG, FINDS databases. Substance released listed as VOC, facility status listed as "remedial action underway". Further information on this facility is summarized in section 4.2.2.
United Technologies Corporation	65	1050 E. Arques Avenue	¼-mile south	Listed on the Cortese, LUST, RCRA-SQG, SLIC, CERC-NFRAP, REF, and FINDS databases. Solvents (primarily TCE and 1,1,1-TCA) detected in ground water that appear to be from up-gradient location (National Semiconductor at 2900 Semiconductor Drive who is named responsible party for cleanup and is using ground water pump and treat technology. This facility is up-gradient of the SDOU as shown on Figure 3 and discussed in Section 4.2.1 and 4.2.2.

4.2 Regional Water Quality Control Board File Review

To further evaluate whether contamination incidents with a potential to significantly impact the ITR Site have been reported in the ITR Site vicinity, we reviewed and relied upon the information presented in the following reports that were obtained from the RWQCB-San Francisco Bay Area Region. Copies of key documents are included in Appendix C.

4.2.1 *2004 Annual Groundwater Monitoring Report and Five Year Review of Groundwater Remedial Action, Subunits 1, 2, and 5 of the Stewart Drive Operable Unit, Sunnyvale, California, (Erler & Kalinowski, Inc. December 2004)*

In 1996 the RWQCB defined the Stewart Drive Operable Unit (SDOU) and five subunits to allow individual dischargers to proceed with investigation and cleanup independently under RWQCB oversight given evidence of commingling of ground water contamination. The subunits are summarized below and shown in Figure 3.

- Subunit 1 - 999 East Arques Avenue (999 Arques Corporation) and the southwest portion of the 1077 East Arques Avenue property (CAE Electronics). Subunit 1 is located south and up-gradient of the ITR Site.
- Subunit 2 - 968 through 970 Stewart Drive (Sobrato Development Company). Subunit 2 is located south and up-gradient of the ITR Site
- Subunit 3 - The northern portion of the 1077 East Arques Avenue property. Subunit 3 is located south and up-gradient of the ITR Site.
- Subunit 4 - Properties located down-gradient of Subunit 3 which includes the eastern portion of the ITR Site.
- Subunit 5 - Properties located north of 968 through 970 Stewart Drive, which includes the east-central portion of the ITR Site.

The adopted RWQCB cleanup and abatement order designated the 999 Arques Corporation responsible for investigation, remediation and monitoring activities in subunits 1 and 5; 999 Arques Corporation, InPrint Corporation, and Sobrato responsible for subunit 2; and CAE Electronics responsible for subunits 3 and 4.

Based on the ground water elevation measurements recorded during the October 2004 monitoring event, the unconfined A-aquifer zone was generally present between depths of approximately 5 to 25 feet below ground surface (bgs). The confined B1 and B2 aquifers are generally encountered at approximate depths of between 20 to 45 feet and 40 to 60 feet, respectively.

It appears that there are 14 wells in subunit 5 on the ITR Site that are monitored. The ground water flow direction was generally toward the north-northeast in the A-zone aquifer across subunit 5; toward the north-northeast in the B1-zone across subunit 2 and the southern portion of subunit 5, and north to northwest in the B2-zone across the northern portion of subunit 5. TCE was the predominant VOC reported in ground water samples collected from the A-zone at concentrations up to 123 ppb; other VOCs detected were cis-1,2-DCE up to 63.3 ppb and PCE up to 29.8 ppb.

Concentrations of these compounds have generally remained stable or declined, except for cis-1,2-DCE detected from ground water sampled from monitoring well AW-2A on the ITR Site (see Figure 4), which has gradually increased from 0.86 ppb in October 2000 to 63.3 ppb in October 2004. Migration of cis-1,2-DCE from the Commercial Street Operable Unit (CSOU), also known as the Mohawk Site, into the western boundary of subunits 2 and 5 was reportedly increasing. This report recommended that the RWQCB consider whether up-gradient dischargers need to take any additional action to reduce the migration of cis-1,2-DCE into the western portion of SDOU subunits 2 and 5 (see Section 4.2.3 for further information).

Ground water extraction began in 1990 in subunits 1 and 2 from the reported source/hot spot areas and ground water monitoring has been on-going to monitor VOC concentrations within subunits 1, 2 and 5 to evaluate remedial action effectiveness. The ground water extraction system reportedly consists of four extraction wells located in subunit 1 and 2. The remedial objective for ground water is to reduce VOC concentrations to below drinking water maximum contaminant levels (MCLs).

At the request of the RWQCB, a review of existing data and conditions was performed to further assess the potential for vapor intrusion into indoor air using as a standard the RWQCB Environmental Screening Levels (ESLs) for vapor intrusion in a commercial setting. In summary, the data reviewed suggested that VOC concentrations beneath commercial buildings and beneath the residential area at the north end of SDOU subunit 5 were below the RWQCB ESLs for vapor intrusion.

The report provided recommendations for continued operation of the ground water extraction and treatment system, continued ground water monitoring with a few modifications and evaluating the data in the next 5-year review report. In areas at the ITR Site that are beyond the hydraulic capture of ground water extraction wells, natural attenuation of detected compounds in ground water is monitored.

4.2.2 *Annual Self-Monitoring Report for 2004, Subunits 3 and 4 of the Stewart Drive Operable Unit, Sunnyvale, California, (Kennedy/Jenks Consultants January 2005)*

In 1996 the RWQCB defined the Stewart Drive Operable Unit (SDOU) and five subunits as described above in Section 4.2.1. CAE Electronics is responsible for subunits 3 and 4. The majority of subunit 4 is located on the eastern end of the ITR Site as shown on Figure 3. Subunit 4 on the ITR Site contains 17 wells, including 4 extraction wells and 13 ground water monitoring wells, which were installed by CAE from 1997 through 2000. The ground water extraction and treatment system consists of four ground water extraction wells, double contained underground piping system, and a ground water treatment system that discharges treated ground water to the storm drain that began operating in 1998. The four ground water extraction wells are located on the ITR Site on the One AMD Place property as shown on Figure 4. Three extraction wells are screened in the A-zone, and one is screened in the B1-zone. The ground water treatment system is located near the northeast corner of the 1077 East Arques Avenue property, which is located south of the ITR Site. In areas that are beyond the hydraulic capture of ground water extraction wells, natural attenuation of detected compounds in ground water is being monitored.

Based on the ground water elevation measurements recorded during the October 2004 monitoring event, the overall ground water flow direction was generally toward

the northeast across subunit 3 and 4, except at the southern portion of subunit 4 which is locally influenced by ongoing ground water extraction being performed by 999 Arques and CAE in the A-zone and B1-zone; lowered ground water elevations near the extraction wells in subunit 4 indicate the presence of hydraulic sinks and ground water flow toward the extraction wells in the A-zone and B1-zone.

The primary VOCs of concern in Subunit 4 are TCE, cis-1,2-DCE and PCE. Concentrations of these compounds detected in the A-zone were TCE up to 360 ppb, cis-1,2-DCE up to 130 ppb and PCE up to 11 ppb. Freon 113, at concentrations typically less than 100 ppb, was detected from most of the wells in subunit 4 and generally at concentrations higher than in subunit 3, which is up-gradient. VOC concentrations continued to be stable, with concentrations in some wells showing a decreasing trend, according to this report.

4.2.3 *Draft Final Remedial Action Plan, Volume I, Mohawk Laboratories, 932 Kifer Road, Sunnyvale, California (The Source Group, Inc. January 2006)*

At the request of the RWQCB, Mohawk Laboratories (Mohawk) prepared this draft report to provide a summary of results of previous investigations, a review of remedial actions, a summary of risk assessment results for current and post-cleanup exposures, a feasibility study evaluating alternative final remedial actions, recommended final remedial actions and cleanup standards, and proposed timeline. At the time this report was reviewed at the RWQCB office by TRC Lowney, the case officer with the RWQCB had not yet reviewed or commented on the report and stated that it was not yet a final document. However, the report contained current ground water monitoring data for the ITR Site and vicinity collected in October 2005 and proposed remedial measures.

The Mohawk site includes the Mohawk property and underlying ground water contamination and is referred to as the Commercial Street Operable Unit (CSOU). The Mohawk property on Kifer Road is located approximately 3,000 feet south of the ITR Site as shown on Figure 3. Ground water impacted with VOCs has migrated to the north, and the impacted area has been subdivided into six areas of concern (AOC). The North Arques AOC crosses the central area of the ITR Site as shown on Figure 5. Primary compounds of concern include vinyl chloride, TCE, cis-1,2-DCE, and PCE. These compounds were reported in the shallow ground water on the ITR Site at concentrations up to 3.9 ppb PCE, 0.8 vinyl chloride, 490 ppb cis-1,2-DCE, and 40 ppb TCE.

The proposed final remedial action for ground water in the North of Arques AOC is monitored natural attenuation (MNA). A MNA Study is proposed as part of the final remedial action. A contingency plan has been developed to address the concerns of increasing concentrations in ground water north of Duane Avenue. (North of Duane Avenue is the residential neighborhood adjoining and off-site of the ITR Site.) Three wells located at the northern boundary of the ITR Site (1-S, NMW-13 and NMW-10) are included in the self-monitoring ground water program. It was proposed that these wells be sampled on a semi-annual basis and results reviewed to identify trends in VOC concentrations. If increasing trends are evident requiring active mitigation, remedial actions, such as enhanced anaerobic bioremediation (EAB) injection, were proposed to be taken to mitigate the northern migration of the CSOU-derived plume following approval from the RWQCB.

4.2.4 *2004 Annual Groundwater Monitoring Report, 915 Deguigne Drive, Sunnyvale, California (Geomatrix Consultants January 2005)*

A ground water monitoring event at the AMD's 915 Deguigne Drive facility was conducted in October 2004 in accordance with the requirements of the Site Cleanup Requirement Order Number 91-101 issued by the RWQCB. The 915 Deguigne Drive property is located on the northwest portion of the ITR Site, Figures 2, 3 and 4. Ground water samples were collected from 27 monitoring wells, five extraction wells and a basement sump. There are 35 ground water monitoring wells, 9 extraction wells and a ground water treatment system at this facility, although details about the treatment system were not provided in this report. Based on the ground water elevation measurements from the sampling event, the ground water flow direction is generally to the north in the A-, B1- and B2-zone aquifers.

Based on past ground water monitoring events, TCE and cis-1,2-DCE have been the VOCs detected at the property at the highest concentrations and with the greatest frequency. Laboratory analyses of ground water samples detected TCE and cis-1,2-DCE in sampled wells at concentrations of up to 160 ppb and 220 ppb in the A-zone aquifer, respectively.

4.2.5 *Annual Groundwater Monitoring Report for October 2004, Former TRW Microwave Facility, 825 Stewart Drive, Sunnyvale, California (Northrop Grumman March 2005)*

A ground water monitoring event at 825 Stewart Drive, the former TRW Microwave Facility, was conducted in October 2004. The 825 Stewart Drive facility is located at the western portion of the ITR Site. There are 26 ground water monitoring wells at this location. Based on the ground water elevation measurements from the sampling event, the ground water flow direction is generally towards the north. Primary chemicals detected at this property are PCE, TCE, cis-1,2-DCE and vinyl chloride. The highest reported concentrations of these compounds in the A-zone aquifer detected at this property were PCE at 4.1 ppb, vinyl chloride at 3,900 ppb, cis-1,2-DCE at 3,600, and TCE at 180 ppb. Ground water beneath this property appears to be impacted from off-property sources, including the former Signetics facility to the southwest, AMD to the south and Mohawk further south-southwest.

Remedial activities at this property include ground water extraction that operated from 1985 to 2001 and consisted of seven extraction wells and an Eductor (subgrade perforated PVC pipe within gravel-backfilled excavation completed in A-zone). Extracted water was treated via an air stripper, and treated water was discharged to the storm drain under permit. Since 2001, enhanced anaerobic biodegradation (EAB) applications have been used to remediate the subsurface at this facility under RWQCB guidance.

4.2.6 *Approval of Addendum to Work Plan for Enhanced Anaerobic Bioremediation Pilot Test, former TRW Microwave Facility, 825 Stewart Drive, Sunnyvale, Santa Clara County (California Regional Water Quality Control Board, July 2005)*

This letter provides approval for an EAB pilot test to expand the existing EAB treatment area where VOCs impacting ground water exceeds cleanup goals. The expansion was primarily based on the success of the ongoing EAB application, which appears to have improved ground water quality at this facility. See 4.2.5 for additional details about this facility.

4.2.7 *Annual Groundwater Monitoring Report January to December 2004, 811 East Arques Avenue Site, Sunnyvale, California* (Locus Technologies January 2005)

The "811 East Arques Avenue Site" encompasses four adjoining properties that are separated by Stewart Drive. The four properties include;

- 440 North Wolfe Road property, formerly occupied by Signetics on the west end of the ITR Site shown as No. 12 on Table 1 and Figure 2,
- 815 Stewart Road property, located on the west end of the ITR Site and shown as No. 11 on Table 1 and Figure 2,
- 811 East Arques Avenue property, formerly occupied by Signetics currently redeveloped with a Lowe's store and located adjacent and south of ITR Site and shown as "F" on Table 2 and Figure 2, and
- 830 Stewart Avenue property, located adjacent and south of the ITR Site and shown as "G" on Table 2 and Figure 2.

The properties at 440 N. Wolfe Road and 811 East Arques reportedly were former semiconductor fabrication and testing facilities. The buildings at 815 and 830 Stewart Drive reportedly were office buildings and are no longer owned or operated by Philips (formerly Signetics). The 440 North Wolfe Road property and adjoining 815 Stewart Drive property are located on the western end of the ITR Site, and the other two properties are located off of the ITR Site and across Stewart Drive. Past investigations have shown that solvents released at the 811 Arques facility contributed to the vicinity VOC ground water contamination. Two other facilities also appear to have contributed to VOC impacted ground water: the offsite AMD facility at 901 and 902 Thompson Place and the TRW facility at 825 Stewart Drive located on the ITR Site (see 4.2.5 and 4.2.6). In 2004 the off-site building at 811 Arques was demolished and the property redeveloped with a Lowe's home supply store; development plans were submitted to the RWQCB for approval in early 2005. Ground water extraction and monitoring at this property is reportedly ongoing.

There are 34 ground water monitoring wells, 12 extraction wells, an extraction trench and a basement dewater sump at the 440 N. Wolfe Road facility and the 815 Stewart Drive facility which are located on the western end of the ITR Site, see Figure 4. Based on the ground water elevation contour maps, drawdowns are evident in the A- and B1-zone aquifer from extraction systems as well as the basement dewatering sump. The ground water flow direction is generally towards the north. Primary chemicals of concern established for this facility are TCE, cis-1,2-DCE and Freon 113. The highest VOC concentrations reportedly detected at the 440 N. Wolfe/815 Stewart facilities were in the area of the extraction trench in the A-aquifer (TCE at 10,000 ppb, cis-1,2-DCE at 2,800 ppb and 1,1-DCA at 280 ppb); the highest concentration of 1,1,2-Trichlorotrifluoroethane (CFC 113) reportedly was detected in the B-1 zone aquifer near the trench at 6,300 ppb.

Remedial activities on the 440 N. Wolfe Road property include ground water extraction and treatment using a combination of hydrogen peroxide, ozone, air stripping and granular activated carbon. Treated effluent is discharged to the Sunnyvale East Channel to the west under permit.

4.2.8 *Annual Groundwater Monitoring Report January to December 2004, The Companies Offsite Operable Unit, Sunnyvale, California (Locus Technologies January 2005)*

The Offsite Operable Unit (OOU) is located off-site of the ITR Site and adjoins the ITR Site to the west and north. Its boundary is shown as the dashed line along Fair Oaks Park and extends to the north beyond Duane Avenue on Figure 3. Ground water beneath the OOU is impacted with VOCs. The OOU consists of the commingled ground water contamination emanating from the "811 East Arques Avenue Site" (described above in 4.2.7), the off-ITR Site AMD facility at 901 and 902 Thompson Place, the AMD facility located on the ITR Site at 915 Deguigne Drive and the TRW facility located on the ITR Site at 825 Stewart Drive. A ground water extraction and monitoring program has been in operation since 1988 to monitor and control the migration of VOCs in the ground water beneath the OOU. The self monitoring program involves annual ground water monitoring of wells, semi-annual monitoring of OOU extraction wells, and continued operation of the OOU ground water recovery wells and the ground water treatment system which is located at 915 Deguigne Drive on the northwest end of the ITR Site.

4.2.9 *2004 Annual Groundwater Monitoring Report, 901/902 Thompson Place, Sunnyvale, California (Geomatrix Consultants, Inc. January 2005)*

A ground water monitoring event at 901 and 902 Thompson Place was conducted in October 2004. The 901 and 902 Thompson Place properties are located approximately 600 feet south of the western end of the ITR Site. Based on ground water elevation measurements from the sampling event, the ground water flow direction is generally towards the north in the A-, B1-, and B2- zone aquifers.

Based on past ground water monitoring events, TCE, cis-1,2-DCE and vinyl chloride reportedly have been the VOCs detected at the property at the highest frequency. Laboratory analyses of ground water samples during a recent monitoring event reportedly detected maximum concentrations of up to 30 ppb PCE, 42 ppb vinyl chloride, 640 ppb cis-1,2-DCE, and 550 ppb TCE within the A1-zone.

5.0 SUMMARY OF PREVIOUS ENVIRONMENTAL REPORTS

TRC Lowney further evaluated two proposed residential developments within the ITR Site (the proposed Taylor Woodrow development and the proposed AMD development, as shown on Figure 4). The proposed Taylor Woodrow development is located at the northeast corner of the ITR Site and includes the addresses 1030, 1031, 1050, 1080 and 1095 E. Duane Avenue. The proposed AMD development is located at the southeast corner of E. Duane Avenue and Deguigne Drive and includes the addresses 920 and 1090 E. Duane Avenue. To further evaluate these two proposed residential developments, we reviewed and relied upon the information present in the following reports.

- *Phase I Environmental Site Assessment and Soil, Soil Vapor, and Ground Water Quality Evaluation, 1090 East Duane Avenue, Sunnyvale, California (TRC Lowney, October 2004)*

This report was prepared for an area of the proposed AMD residential development located at the southeast corner of Deguigne Drive and E. Duane Avenue on the ITR Site. At the time the report was written, this area was

described as it appears today, developed with a grass field and a vacant and closed service station. The report included an environmental site assessment (current and historical property use and reported releases in the site vicinity) and results of soil testing for pesticides and select metals due to historical agricultural use, ground water testing and soil vapor testing due to the presence of VOC impacted ground water beneath this area.

Soil sampling and testing revealed concentrations of the pesticide dieldrin ranging from <0.02 to 0.085 parts per million (ppm). Other pesticides detected in soil included endrin and total DDT; however, dieldrin was the only pesticide detected above its respective residential PRG and direct exposure ESL (the regulatory screening levels). The highest reported dieldrin concentrations were limited to the southern property boundary, where elevated levels above residential regulatory thresholds were detected in the upper approximately 2½ feet of soil. Based on the analytical results, mitigative options for the portion of the property near the southern property boundary were discussed and included 1) capping the former agricultural portion of the property with 2 feet of clean imported material prior to development; 2) placing impacted material beneath foundations, pavements, roadways, sidewalks and/or in open space/park areas following approval from the local oversight agency; and 3) reducing concentrations by biological treatment.

Three ground water grab samples were tested and various HVOCs were detected including TCE up to 150 ppb, cis-1,2-DCE up to 100 ppb, both above California Primary Maximum Contaminant Levels (MCLs) of 5 ppb and 6 ppb, respectively. The source of the HVOCs appeared to be from up-gradient sources at 999 Arques Corporation and CAE Electronics.

Eight soil vapor samples were collected at random locations to evaluate the potential for volatilization of chlorinated solvents from impacted ground water that had migrated beneath this property. Laboratory test results detected several VOCs in soil vapor; however, only TCE from a sample at the northeast corner of the property exceeded the residential ESL established by RWQCB. It was concluded that mitigative measures may be required in this northeast area if residentially developed because soil gas exceeded regulatory thresholds for residential development. Additional soil vapor sampling was recommended to further quantify the area of the property requiring vapor mitigation; selected mitigation measures would require regulatory approval.

This report also included a summary of previous investigations at the former Jim's service station located at 920 E. Duane Avenue which operated from 1959 until 1997. Two 10,000-gallon gasoline USTs and one 280-gallon waste oil UST were located at this former service station which was located at the southeast corner of E. Duane Avenue and Deguigne Drive. Following tank removals, soil samples were collected from the fuel UST excavations and from beneath the fuel islands and product lines and reportedly did not contain petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, or xylenes (BTEX), or methyl tertiary butyl ether (MTBE) above laboratory detection limits. Ground water samples collected from the vicinity of the former USTs reportedly contained up to 3,400 ppb TPHg, 2,800 ppb MTBE, 54 ppb benzene, 76 ppb toluene, and 390 ppb xylenes. Following removal of approximately 875 gallons of ground water from the tank excavations,

concentrations dropped to 520 ppb TPHg and 21 ppb xylenes; no other compounds were detected. The Santa Clara Valley Water District subsequently issued a case closure for the former service station facility on March 23, 1998. The case closure summary stated that the corrective action did not need to be reviewed if land use changed.

- *Phase I Environmental Site Assessment, Taylor Woodrow Homes, Inc., 7.3 Acres, (1030, 1031, 1050, 1080 & 1095 E. Duane Avenue, Sunnyvale, California (Shaw Environmental, February 2005)*

This report was prepared for the area of the proposed Taylor Woodrow residential development at the northeast end of the ITR Site. At the time this report was written, this property was described as it appears today, developed with five multi-tenant buildings and associated parking lots. Four of the buildings contained a combination of office and warehouse space, and the fifth building was exclusively used for office space. This assessment did not list tenants or provide information on tenant use of hazardous material/waste storage or use. Records reviewed at the Sunnyvale Fire Department indicated that a previous tenant, Metelics Corporation at 1031 E. Duane Avenue, Suite C, used hazardous materials and had a Closure Plan dated 1988 that noted solvent spills "that needed to be cleaned thoroughly", a PI Etch station, heavy oil stains in the "back area" where pumps had leaked oil and possible core sampling requirements. A Notice to Comply for corrective action was issued to HoribaStec Instruments at 1080 E. Duane Avenue, Suite I and J in 2004; HoribaStec was a manufacturer of semiconductor components and equipment with hazardous material use and hazardous waste storage.

This report referred to previous studies that identified on-property contamination from former tenants, off-site contamination from up-gradient sources (service station and "Superfund sites"), and ACM inside the five buildings. Based on soil, ground water and vapor sampling done by Golder Associates in 2000, gasoline hydrocarbons and MTBE and tert-amyl methyl ether were detected (the media was not provided) on the property, reportedly possibly originating from the adjoining service station. Benzene, toluene, TCE, and trichlorotrifluoroethane were detected in the soil gas samples (concentrations not provided) in widespread locations across the property. The source of solvents "could not be identified".

The report identified four recognized environmental conditions at this property; 1) co-mingled solvent ground water plumes from off-site sources and recommended ground water, soil and soil vapor sampling 2) MTBE and benzene in ground water from adjoining service station and recommended ground water testing for TPH-g, MTBE, BTEX and VOCs in southeast corner of the property, 3) possible asbestos containing materials in buildings at the property, (it was noted that ceiling tiles tested in 2000 during a previous study did not contain asbestos) and 4) possible lead-based paint on structures at the property.

- *Additional Limited Phase II Investigation, APN 421-07-21; East Duane Avenue at Stewart Drive, Sunnyvale, California (Shaw Environmental, March 16, 2005)*

This report was prepared for the area of the proposed Taylor Woodrow residential development. The report provides data for additional ground water, soil and soil vapor sampling activities completed at this property. An initial sampling event was performed by Shaw and documented in a letter report dated February 10, 2005. This additional sampling event included collecting 15 ground water samples, soils samples from 8 borings, 7 soil vapor samples, 17 samples of suspect ACM and 20 paint chip samples for lead from the five buildings on the property. Ground water and soil samples were tested for TPHg, TPHd, BTEX, MTBE, VOCs, and CAM 17 metals. Soil vapor samples were tested for VOCs. (It should be noted that not all the tables or appendices were provided for review.) Asbestos was not detected in building materials sampled. Lead was detected in approximately 60% of the paint chip samples.

Petroleum hydrocarbons were reportedly detected in ground water samples at concentrations up to 6,900 ppb TPHg, 17,000 ppb diesel, 5,700 ppb MTBE and 69 ppb xylenes during the January and February 2005 sampling events. These contaminants appeared to be related to the adjoining up-gradient gas station.

TCE and cis-1,2-DCE were reportedly detected in 10 grab ground water samples across this property. The highest concentrations of these compounds were detected in boring B-12 located just east of the building at 1031 E. Duane Avenue on the western portion of this property where 49 ppb DCE, 6.4 ppb PCE and 100 ppb TCE were detected. Soil testing indicated that PCE, TCE and xylenes were present in one or more of the soil samples; the highest concentrations were in B-12 at approximately 5½ feet below the surface with 0.059 ppm PCE, 0.042 ppm TCE and 0.025 ppm xylenes. Concentrations were below established ESLs and PRGs and it was concluded that it was unlikely that soil and ground water remediation would be warranted with respect to subsurface solvent contamination.

Cobalt (up to 4.0 ppb), nickel (up to 17 ppb) and selenium (up to 30 ppb) were detected in ground water at concentrations above their respective established ESLs. No conclusion or recommendation was made regarding this finding.

Vanadium was detected in one soil sample above its PRG and arsenic was detected in every soil sample tested at concentrations above its PRG. It was concluded that arsenic is naturally occurring and that during rough grading activities for the proposed residential development the concentrations of arsenic and vanadium were expected to decrease.

Soil vapor testing indicated benzene present at 85 ug/m³ (ESL for benzene is 84 ug/m³) at the northeast corner of this property and TCE present at 1,200 ug/m³ (ESL for TCE is 1,200 ug/m³) at the southwest property boundary. Because this property was proposed for residential development, it was recommended that a risk assessment analysis be done. It was also recommended that the risk assessment model any health risks to construction workers if ground water is encountered during construction and be used to determine if any site remediation is necessary prior to development. The report also stated that in the event that impacted soil or ground water is encountered during construction activities, appropriate disposal measures would be necessary, which could include removal of "contaminated" soils and temporary treatment of ground water.

6.0 CONCLUSIONS

6.1 Historical Summary

A topographic map dated 1920 shows the ITR Site with no structures and a road resembling Duane Avenue to the north of the ITR Site. Based on the aerial photographs reviewed, the ITR Site was planted with various fields of row crops as early as 1939, and continued to be cultivated with different field configurations through at least 1956 with a few small structures present at the northeast end of the ITR Site at that time. Beginning in the 1960s, the ITR Site began to be developed with medium sized structures with increasing development through the 1970s. By the early 1980s the ITR Site generally appeared as it does today with existing roadways and improvements. ITR Site information prior to 1939 was unavailable from sources researched, but based on our experience, ITR Site use prior to 1939 likely was either agricultural or undeveloped land.

Based on the reports reviewed, ITR Site occupants involved in electronics manufacturing or research and development included Phillips Semiconductors (Signetics), AMD and TRW. In addition, a gasoline service station was present at the north-central portion of the ITR Site from 1959 to 1997. Other occupants have included tenants who used and stored various quantities of hazardous materials and occupants who used the buildings primarily for office space.

Based on this study, ground water beneath the majority of the ITR Site has been impacted from on-site and off-site releases of VOCs including TCE, cis-1,2-DCE, PCE, Freon-113 and vinyl chloride. Reported on-site releases and off-site releases are summarized below.

On-ITR Site Releases: During the course of operations, releases of VOCs have impacted soil and ground water at the TRW (825 Stewart Drive) and AMD (915 Deguigne Drive) facilities at the western end of the ITR Site. Both facilities are listed as Superfund or NPL sites. Ground water remediation and ground water monitoring is on-going at each of these two facilities under separate Orders from the RWQCB. In addition, releases of petroleum related compounds occurred at the former service station at 920 E. Duane Avenue with impacts to soil and ground water; the status at that facility is case closed with no further action required by the regulatory agency, the SCVWD. Finally, based on soil sampling and as concluded by others (see Section 5.0), it appeared possible that releases of VOCs may have occurred at the property at the northeast end of the ITR Site. However, ongoing ground water monitoring by responsible parties from up-gradient VOC release sources in this area does not indicate an additional significant source at the northeast end of the ITR Site and currently no additional sources are suspected in this area, based on reports reviewed during this assessment.

Off-ITR Site Releases: Responsible parties have been identified for the off-site releases that have impacted ground water beneath the ITR Site. The releases appear to be primarily from the five facilities listed below that are actively monitoring and remediating ground water as summarized below.

- Adjoining up-gradient former Signetics property at 811 E. Arques where VOC impacted groundwater has migrated beneath the ITR Site at 440 N. Wolfe Road property at the western end of the ITR Site; ground water remediation and monitoring at the 440 N. Wolfe Road facility on the ITR Site is on-going under the direction of the RWQCB.

- Up-gradient NPL facility, AMD at 901 Thompson Place, has impacted ground water with VOCs. That plume has commingled with the adjoining Signetics property's plume (see above bullet) and the on-ITR Site TRW plume at the western end of the ITR Site; ground water remediation and monitoring is occurring at the AMD facility and is ongoing under direction from the RWQCB.
- Up-gradient Mohawk facility on Kifer Road has impacted ground water with VOCs, and that plume has migrated beneath the central portion of the ITR Site. Ground water remediation is occurring at the Mohawk facility and ground water monitoring at the ITR Site has been proposed following approval from the RWQCB.
- Up-gradient 999 Arques Corporation at 999 Arques Avenue where VOC impacted ground water has migrated beneath the east-central portion of the ITR Site. Ground water remediation is occurring at the 999 Arques facility and ground water monitoring is ongoing at the ITR Site under direction from the RWQCB.
- Up-gradient CAE Electronics at 1077 E. Arques Avenue where VOC impacted ground water has migrated beneath the eastern portion of the ITR Site. Ground water remediation is occurring at the 1077 E. Arques facility. Ground water extraction wells are located on the southeast portion of the ITR Site and monitoring is ongoing under direction from the RWQCB.

In addition, the adjoining and up-gradient Chevron service station at 1097 E. Duane Avenue has impacted ground water with petroleum related compounds that appear to have migrated beneath the northeast end of the ITR Site.

Based on information reviewed, the concentrations of detected VOCs on the ITR Site are generally higher on its western half. Concentrations of VOCs in ground water have been reported to be generally stable and/or are declining, except at the central portion of the ITR Site where concentrations of 1,2-DCE have shown an increasing trend and appear to be attributable to the off-site Mohawk release. In areas at the ITR Site that are beyond the hydraulic capture of ground water extraction wells, natural attenuation of detected compounds in ground water is being monitored.

In 2004 and 2005, TCE was detected in soil vapor samples at two locations on the northeast end of the ITR Site at concentrations above the RWQCB ESL for residential use.

The potential for soil, soils vapor or ground water to have been significantly impacted by historic site activities appears to range from low to high, depending upon the property location within ITR Site boundaries. We recommend detailed review of site specific property conditions prior to redevelopment activities to evaluate if mitigation measures may be needed. Depending on the location of the property with the ITR site, we also recommend soil vapor sampling for VOCs to evaluate the current potential for volatilization of chlorinated solvents from impacted ground water. Soil and ground water sampling may also be needed. Based on results, mitigation measures may be required. If needed, the selected mitigation measures would require regulatory approval prior to development. The RWQCB should be contacted to provide guidance and input on proposed mitigation measures, and to approve plans

on future developments so that existing ground water monitoring programs and ongoing remediation activities will not be interrupted or compromised by redevelopment activities.

6.2 Agricultural Use

The ITR Site was used for agricultural purposes for several decades. During the course of agricultural use, pesticides, such as DDT, likely were applied to crops in the normal course of farming operations. In addition, testing of shallow soil in 2004 at the proposed AMD development on the ITR Site detected concentrations of the pesticide, dieldrin, above residential ESLs. Therefore, as redevelopment of the ITR Site for residential use is planned, soil sampling and analyses should be performed to evaluate the residual pesticide concentrations, if any, and potential health risks to future residents and construction workers. In addition, off-ITR site disposal of excess soil can be of concern if high pesticide levels are present. Depending on the test results, mitigation measures may be required. If required, the selected mitigation measures would need regulatory approval prior to development. The RWQCB should be contacted to provide guidance and input on proposed mitigating measures and to approve plans on future developments so that existing ground water monitoring programs and ongoing remediation activities will not be interrupted or compromised by redevelopment activities.

6.3 Chemical Storage and Use

Current chemical storage and use by occupants at the ITR Site varies from facility to facility, from large quantity generators of hazardous waste to no reported or observed use of hazardous materials. Sixteen addresses were listed as hazardous material use facilities and six of those facilities were listed with a reported release within the ITR Site. Soil and ground water beneath the western portion of the ITR Site has been impacted with VOCs from releases by current or former occupants and releases have been suggested from tenants at the northeast end of the ITR Site, see Section 6.1. In addition, there is a long history of chemical use at some properties within the ITR Site. Therefore, prior to purchase or redevelopment, we recommend that the chemical storage and use history be researched for each facility and that facility closure requirements by local regulatory agencies, i.e. the Sunnyvale Fire Department, have been met. In addition, site specific property history and soil vapor, soil and ground water quality should be evaluated.

6.4 Wells

There are over 100 ground water monitoring wells and at least 32 extraction wells located across the ITR Site that are actively monitoring and treating ground water under Orders issued by the RWQCB. Once the RWQCB agrees that the wells are no longer required, they should be properly abandoned by the responsible parties in accordance with applicable regulations if continued use is no longer intended.

6.5 Asbestos

Due to the age of many of the on-site buildings, asbestos-containing materials (ACMs) may be present. If demolition, renovation, or re-roofing of the buildings is under consideration, an asbestos survey must be conducted under National Emissions Standards for Hazardous Air Pollutants (NESHAP) guidelines.

In addition, NESHAP guidelines require that all potentially friable ACM be removed prior to building demolition or renovation that may disturb the ACM.

6.6 Lead-Based Paint

In 1978, the Consumer Product Safety Commission banned the use of lead as an additive in paint. Currently, the U.S. EPA and U.S. Department of Housing and Urban Development are proposing additional lead-based paint regulations. Based on the age of many on-site buildings, lead-based paint may be present. If lead-based paint is still bonded to the building materials, its removal is not required prior to demolition. It will be necessary, however, to follow the requirements outlined by Cal/OSHA Lead in Construction Standard, Title 8, California Code of Regulations (CCR) 1532.1 during demolition activities; these requirements include employee training, employee air monitoring, and dust control. If lead based paint is peeling, flaking or blistered, it should be removed prior to demolition. It is assumed that such paint will become separated from the building components during demolition activities; thus, it must be managed and disposed as a separate waste stream. Any debris or soil containing lead paint or coating must be disposed at landfills that are permitted to accept the waste being disposed.

6.7 Fluorescent Light Ballasts and Tubes

Fluorescent lights are likely present in on-site buildings. Fluorescent light ballasts manufactured before 1978 may contain PCBs. Ballasts manufactured after January 1, 1978 should not contain PCBs and are required by law to contain a label that states that no PCBs are present within the units. Fluorescent light tubes also may contain mercury. The Department of Toxic Substances Control (DTSC) considers these wastes Universal Wastes. Universal Wastes are lower risk hazardous wastes that require proper disposal and handling. Disposal at an appropriate recycling facility is encouraged.

6.8 Transformers

Pad-mounted transformers, owned by PG&E, are present across the ITR Site. These transformers may contain transformer oil. Although oil is typically not highly toxic or mobile in the environment, transformer oil may contain polychlorinated biphenyls (PCBs). If the transformer is to be removed or if leaks are observed, testing of the oil for PCBs should be performed. The manufacturer may also be able to provide information regarding the PCB content, if any.

6.9 Elevators

On-site buildings likely contain elevators that use hydraulic fluid, which may contain PCBs. Hydraulic elevator units should be periodically inspected for leakage and, if a leaking unit is identified, it should be repaired and any fluid or fluid-impacted waste disposed in accordance with applicable regulations.

6.10 Electric Transmission Lines

Electric transmission lines and a PG&E substation are located along the western property boundary at the southwest corner of the ITR Site. While electromagnetic fields (EMFs) occur naturally and are present in everything from visible light to radio

waves to X-rays, attention has focused on whether exposure to EMFs associated with alternating-current electricity is hazardous.

Electric current traveling in transmission lines produces both electric and magnetic fields, and some studies have found an association between exposure to electric and magnetic fields and health problems. Other laboratory and epidemiological studies have found no threshold value, dose response or causative relationship that demonstrates significant adverse physical effect from EMFs.

In recent years, there has been considerable controversy regarding the potential health effects resulting from long-term exposure to electromagnetic fields (EMFs). There is no basis at this time to conclude that future employees or residents on the project site would be exposed to significant EMF-related hazards. However, the presence of the lines may negatively impact public perception.

6.11 Urban Runoff Pollution Prevention Program

The Urban Runoff Pollution Prevention Program, also called the Non-Point Source Program, was developed in accordance with the requirements of the 1986 San Francisco Bay Basin Water Quality Control Plan to reduce water pollution associated with urban storm water runoff. This program was also designed to fulfill the requirements of the Federal Clean Water Act, which mandated that the EPA develop National Pollution Discharge Elimination system (NPDES) Permit application requirements for various storm water discharges, including those from municipal storm drain systems and construction sites.

Construction activity resulting in a land disturbance of 1 acre or more, or less than 1 acre but part of a larger common plan of development or sale, must obtain a Construction Activities Storm Water General Permit. A Notice of Intent (NOI) and Storm Water Pollution Prevention Plan (SWPPP) must be prepared prior to commencement of construction.

6.12 Hoods, Ducting and Equipment

We recommend the proper removal and disposal of all interior and exterior equipment (including ground water treatment systems, associated trenches, piping and monitoring and extraction wells), exhaust hoods, ductwork and fans that may be present in on-site buildings prior to purchase or redevelopment.

6.13 Storage Tanks

The California Code of Regulations requires that all underground storage tanks used for hazardous substances be closed if they are not in use. Temporary closure requirements apply if the tank will be used within 12 months. The application for temporary closure must be submitted within 90 days from the date of last use. Permanent closure (usually removal) is required if the tank will not be used within 12 months. We recommend contacting local UST permitting agencies to evaluate permitting requirements.

6.14 Hydraulic Lifts

Hydraulic lifts may be present in on-site buildings. Prior to purchase or redevelopment of the ITR Site, we recommend contacting the local regulatory agency to evaluate their requirements regarding the lifts; we recommend removing the lifts if they are no longer needed. Hydraulic fluid leaks potentially can occur from the pistons, reservoirs, and piping. Although hydraulic fluid is typically not highly toxic or mobile in the environment, some hydraulic fluids may have contained PCBs. During removal of the lifts, soil samples should be collected to document soil quality.

6.15 Export Soil and Dewatering

We understand that the proposed Taylor Woodrow development at the northeast end of the ITR Site will be developed with a building that is planned to have below-grade parking that will likely extend several feet below the ground water table that is currently at a depth of approximately 6 to 10 feet. During construction activities, soil will need to be transported to other nearby developments or a nearby landfill. The receptors of this material may require analytical testing. Test results indicated that some soil samples contained metals and solvents; the cost to dispose of the soil may be increased. In addition, the shallow soil should be tested for pesticides due to the past agricultural use of the ITR Site.

Dewatering will be required during construction to maintain ground water below the floor of the garage. Depending on the building design, on-going dewatering may be needed in the subgrade areas of the structures as well. Dewatering systems must be approved by the CRWQCB as these systems may negatively impact regional ground water clean up efforts. Since the extracted ground water will likely contain petroleum hydrocarbons, metals and VOCs, disposal costs may be increased. Depending on the water quantity, disposal options may include discharge to the sanitary sewer system (if approved), off-site disposal at a treatment/recycling facility, or on-site treatment and subsequent discharge to the storm sewer system under a NPDES permit.

The cost to treat extracted ground water can vary substantially and is dependent on the ground water extraction rate, discharge requirements, and the levels and types of contaminants present.

Other similar developments planned for the ITR Site likely will require site-specific evaluation for managing potentially contaminated soil and/or ground water.

6.16 Soil Management Plan

Based on the long industrial and agricultural history of the ITR Site, buried structures, debris or impacted soil may be encountered during ITR Site development activities; these materials may require special handling and disposal. To limit construction delays, we recommend that Soil Management Plans (SMP) be developed for each proposed new development to establish management practices for handling these materials/structures if encountered.

6.17 Environmental Insurance

Due to the lengthy industrial use of the ITR Site, contaminated materials may be encountered during ITR Site development. Consideration should be given to purchasing insurance to help protect against these liabilities. There are two primary

insurance policies that provide significant protection against environmental liability risks:

- Pollution Legal Liability protects against third party claims for personal injury and property damage, and related risks;
- Cleanup Cost-Cap protects against increases in cleanup costs due to unknown or changing conditions, including more stringent requirements than currently exist.

Other environmental insurance coverages are available to protect financial institutions lending money for the purchase of distressed assets, contractors working on environmental projects, and underground storage tank closure liability. Generally, if the risk is related to environmental conditions, it is likely that an insurance product can be adapted to protect against risk.

7.0 LIMITATIONS

As with all site assessments, the extent of information obtained is a function of client demands, time limitations, and budgetary constraints. Our conclusions and recommendations regarding the ITR Site are based on readily observable site conditions, review of readily available documents, maps, aerial photographs, and data collected and/or reported by others. Due to poor or inadequate address information, the regulatory agency database report listed several sites that may be inaccurately mapped or could not be mapped; leaks or spills from these or other facilities, if nearby, could impact the ITR Site. As directed by you, we are relying on information presented in reports provided to us by you or your representative. We are not responsible for the accuracy of information or data presented by others.

Because publicly available information often cannot affirm the presence of recognized environmental conditions, there is the possibility that such conditions exist. Our conclusions and recommendations in this site assessment are qualified in that no soil, ground water, air, or building material analyses were performed. Sampling and analysis lead to a more reliable assessment of environmental conditions, conditions that often cannot be noted from typical Phase I activities. Should you desire a greater degree of confidence, these samples should be obtained and analyzed to further evaluate environmental conditions.

This report was prepared for the sole use of David J. Powers & Associates. We make no warranty, expressed or implied, except that our services have been performed in accordance with environmental principles generally accepted at this time and location.

8.0 REFERENCES

California Regional Water Quality Control Board 1999. "Order No. 99-098, 1077 East Arques Avenue, Subunit 3, Stewart Drive Operable Unit, Sunnyvale, Santa Clara County

California Regional Water Quality Control Board 2005. "Approval for Addendum to Work Plan for Enhanced Anaerobic Bioremediation Pilot Test, former TRW Microwave Facility, 825 Stewart Drive, Sunnyvale, Santa Clara County." July 22, 2005

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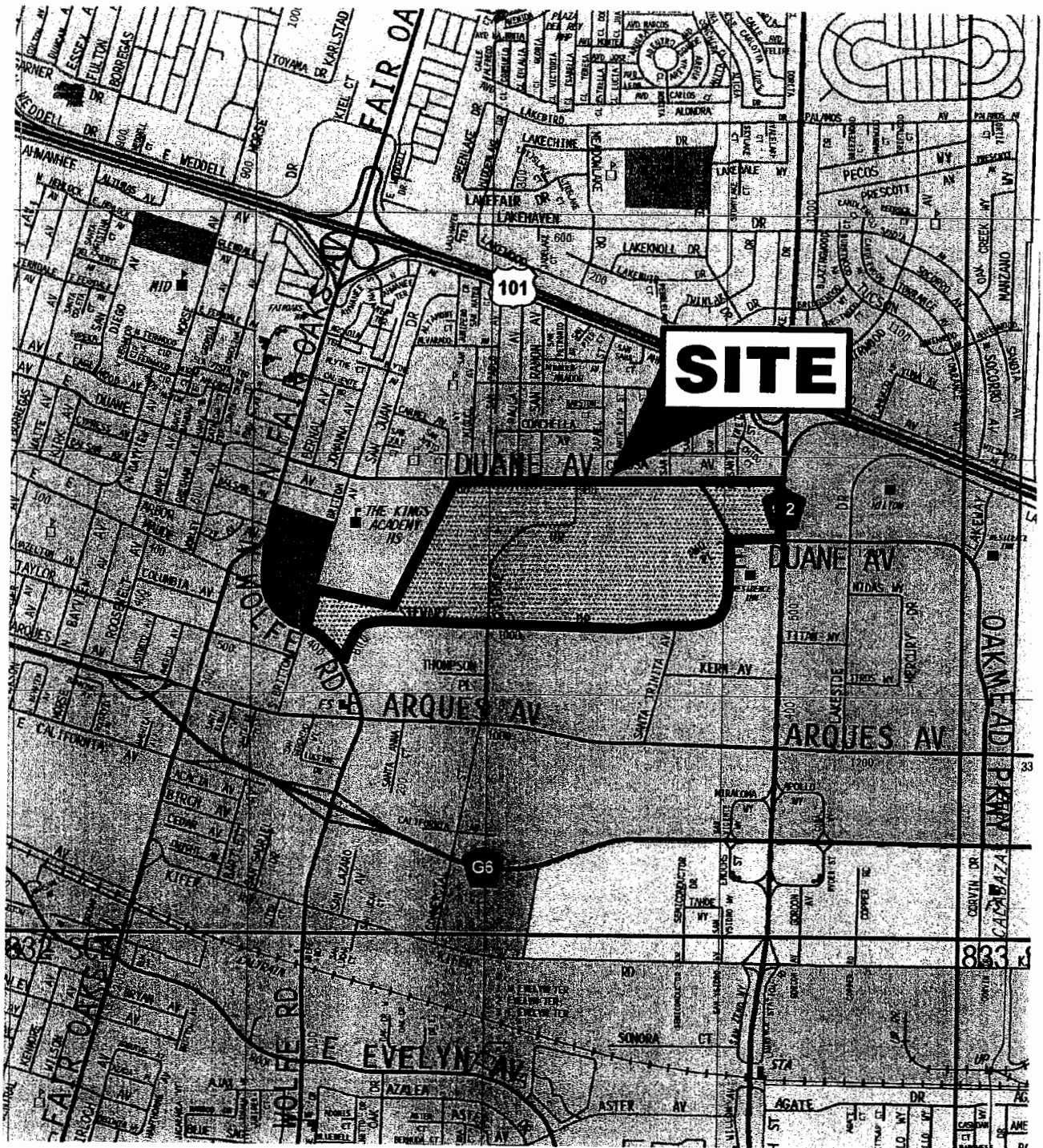
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Shaw Environmental, Inc. 2005. "Additional Limited Phase II Investigation, APN 421-07-021; East Duane Avenue at Stewart Drive, Sunnyvale, California." March 16, 2005.

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VICINITY MAP
130-ACRE EAST SUNNYVALE ITR
Sunnyvale, California



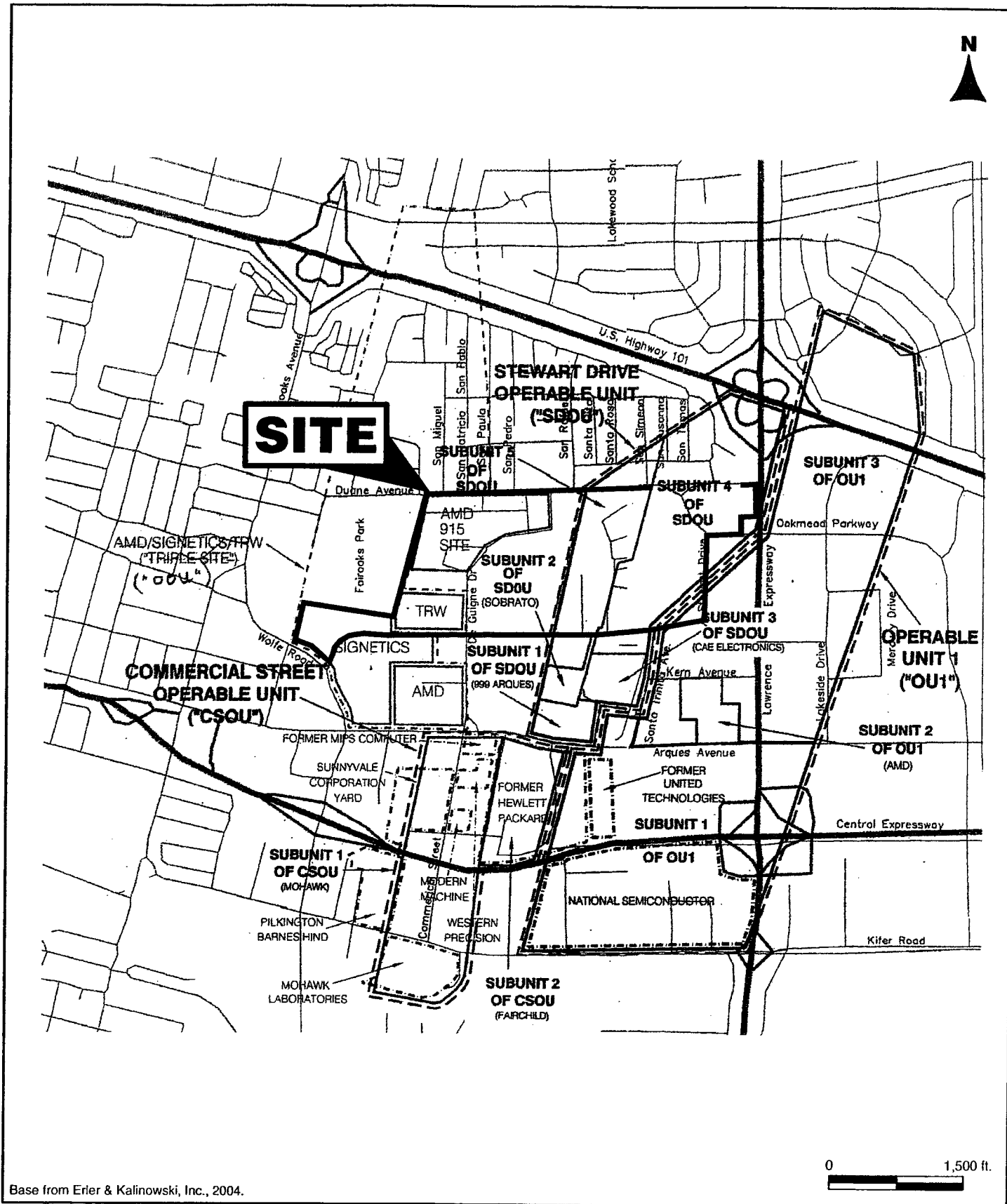
See Table 1 and 2 for details

Base from USGS TerraServer, dated 2/04.

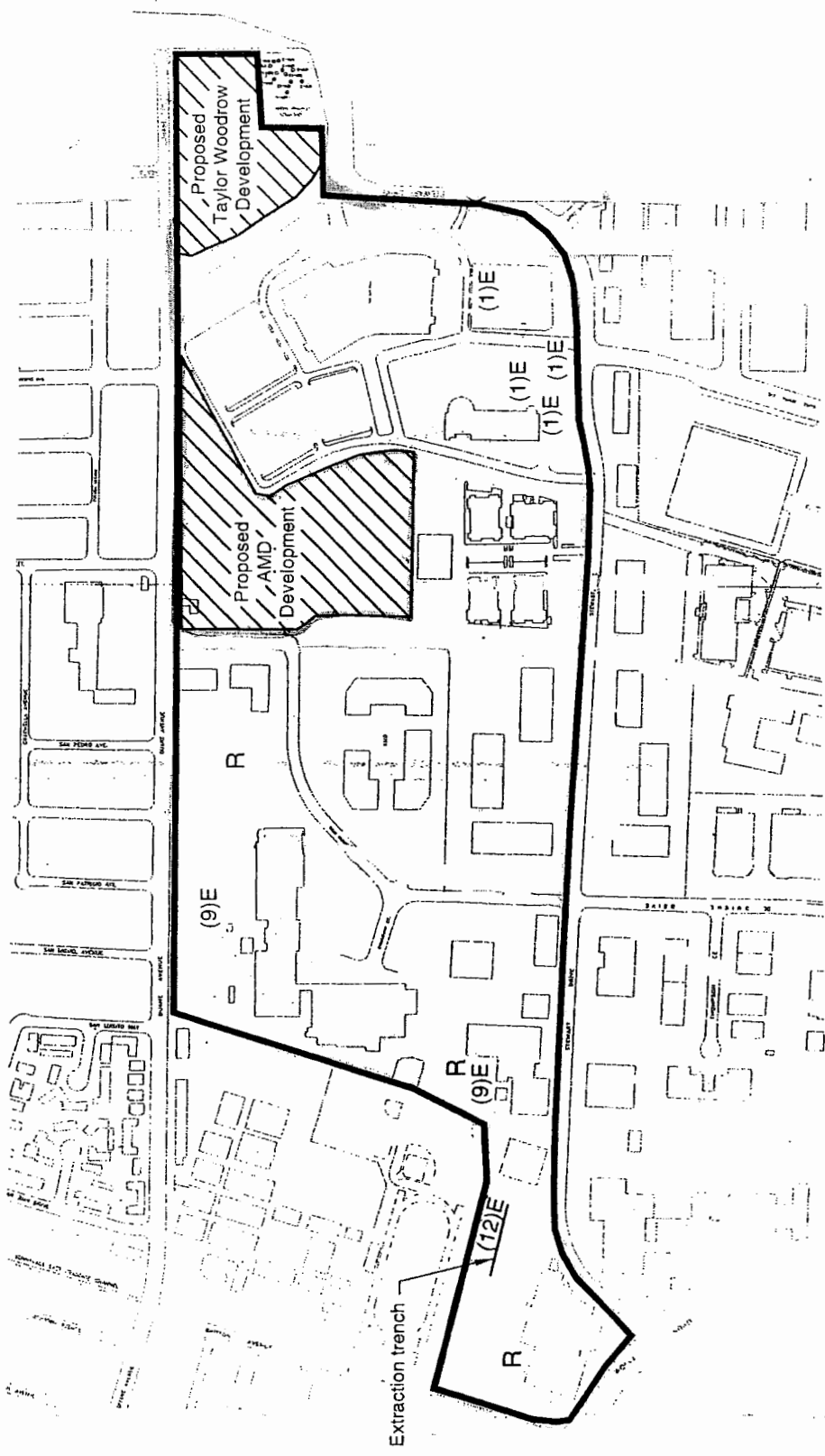
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SITE PLAN

130-ACRE EAST SUNNYVALE ITR
Sunnyvale, California



STUDY AREA LOCATION MAP
130-ACRE EAST SUNNYVALE ITR
Sunnyvale, California

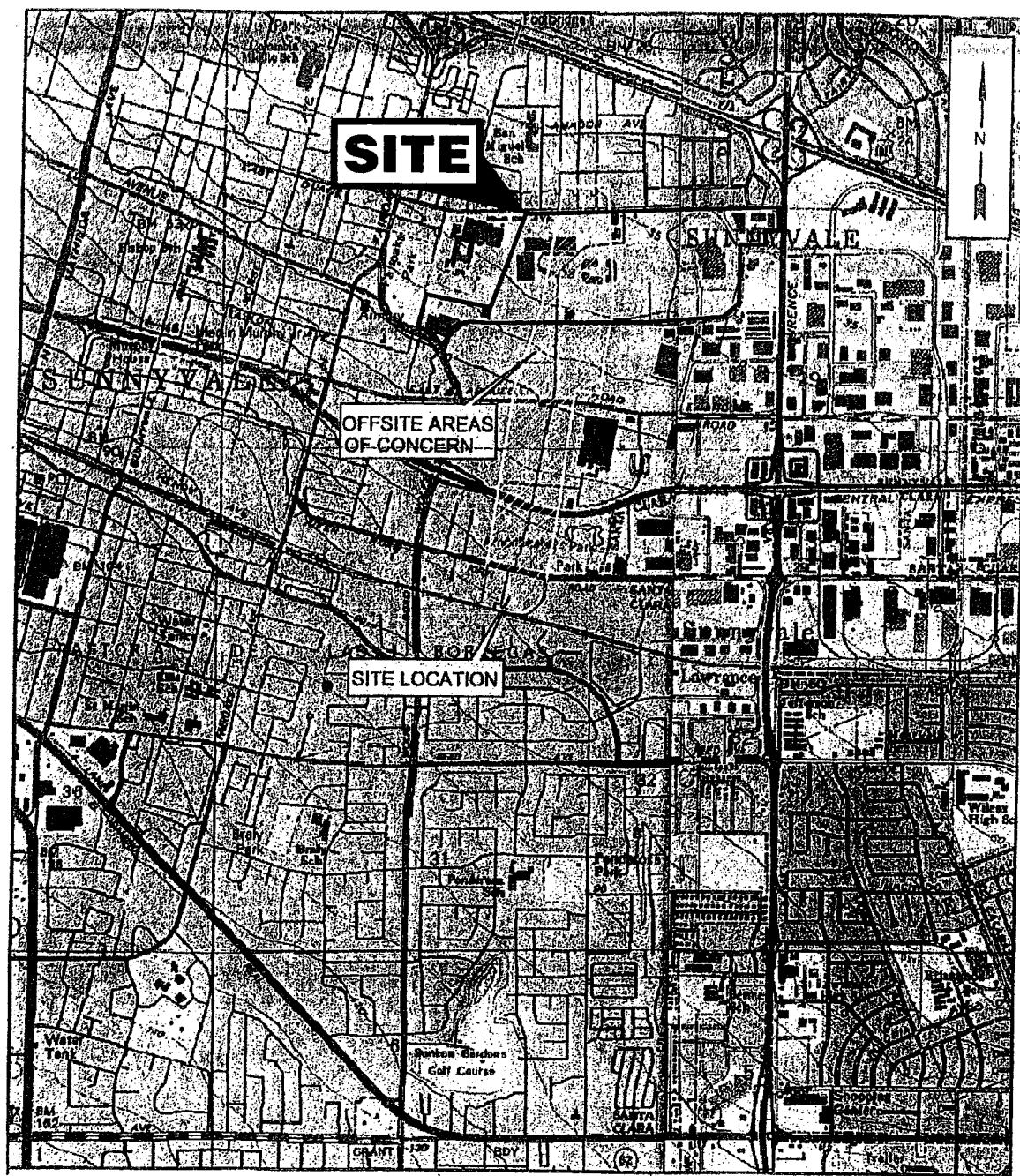


LEGEND
(12)E - Number of extraction wells
R - Remediation system

Base by Unknown.
4/06/EB

SITE PLAN
130-ACRE EAST SUNNYVALE ITR
Sunnyvale, California

TRC Lowney



Base from The Source Group, Inc. 2005.

406'EB

OAC FROM OFFSITE MOHAWK RELEASE

130-ACRE EAST SUNNYVALE ITR
Sunnyvale, California

NOTE:

**THE APPENDICES TO THIS REPORT ARE ON-FILE WITH
THE COMMUNITY DEVELOPMENT DEPARTMENT**



September 21, 2006
858-47B

Mr. John Schwarz
DAVID J. POWERS & ASSOCIATES
1885 The Alameda, Suite 204
San Jose, California 95126

**RE: SCREENING LEVEL CHEMICAL
RISK APPRAISAL
ITR STUDY AREA
SUNNYVALE, CALIFORNIA**

Dear Mr. Schwarz:

At the request of City of Sunnyvale and David J. Powers & Associates, TRC Lowney reviewed the chemical information provided by the City of Sunnyvale and conducted a screening level risk appraisal to estimate the potential off-site consequence of potential releases of those substances to proposed residents in the 130 acre Industrial-to-Residential (ITR) area of Sunnyvale, California. The results of the appraisal are summarized below.

1.0 CHEMICALS OF CONCERN

The chemicals of potential concern are semi-conductor gases used at 915 DeGuigne (Spanson) and 975 Stewart (Metelics) and stored in cylinders equipped with restrictive flow orifices (RFOs). Table 1 below identifies a representative sample of chemicals of concern and storage parameters provided by the City of Sunnyvale.

Table 1. Chemicals of Concern

Parameter	Chlorine	Chlorine Trifluoride	Silicon Tetrafluoride	Dichlorosilane
RFO diameter (Inches)	0.01	0.01	0.01	0.01
Molecular Weight	70.91	92.46	104.08	101.01
Supplied Pressure (PSI)	86	7	1000	9
Volume (ft3)	216	126	185	344
Pounds	40	30	50	90

Table note: RFO = restrictive flow orifice

2.0 RELEASE SCENARIOS

The Santa Clara County Toxic Gas Ordinance (TGO) regulates semi-conductor facilities and other toxic gas users. For semi-conductor facilities, acutely hazardous process materials are housed in secondary containment facilities that typically include ventilated gas cabinet storage of gases, leak detection, and treatment capability for discharged gases. In addition, other standard industry controls include valves equipped with restrictive flow orifices (RFO) for the primary gas containment (cylinder). The gas cylinders are equipped with RFOs to limit the release of toxic gases in the rare event of an equipment and/or system failure during processing. The supply pressure of the gas and the area of the orifice determine flow through the RFO.

The selected hypothetical external release scenario assumes that all engineering controls required by code are in place and functional and consists of a cylinder delivery where an accidental fall of a cylinder damages its valve cover and valve. In this unlikely event, and assuming that the damage is limited to a valve, a leak occurs through a limiting orifice (i.e., valve stem packing leak). The rate of release can be reasonably approximated by gas flow through the installed RFOs. Due to the limited orifice, this scenario results in a steady release of gas from the cylinder. Please note that this scenario is not the worst-case release but a plausible accidental release scenario, given standard industry controls. For the worst case event (as defined by the Environmental Protection Agency), the contents of the cylinder would be emptied into the atmosphere in 10 minutes. This faster release scenario could result in greater or lesser effects than those described below, depending on the actual materials released and the atmospheric conditions at that time.

2.1 Release Rates

As requested by the City of Sunnyvale, this assessment incorporates flow through RFOs for release rate estimates. For releases modeled using flow through RFOs, the duration of the release was conservatively limited to 1 hour. Release rates through RFOs are estimated from "Pure Gases, Gas Mixtures, Gas Delivery Equipment, Version 9.0" Scott Semiconductor Gases (Scott 9.0).

Flow through a restrictive orifice is estimated as follows:

$$Flow (ft^3 hr^{-1}) = [767 \times A \times P_s] \times CF^{0.5}$$

where:

Flow	=	Standard cubic feet per hour
A	=	Area of orifice (in ²)
P _s	=	Supply pressure of the gas in pounds per square inch (psi), and
CF	=	Correction Factor for the Gas, molecular weight of air divided by the molecular weight of the gas/gas mixture (28.96/MW _{gas})

Table 2 below summarizes release rates estimate by the above method.

Table 2. Release Rate Estimates for Chemicals of Concern

Parameter	Chlorine	Chlorine Trifluoride	Silicon Tetrafluoride	Dichlorosilane
Constant (k)	767	767	767	767
Area (in ²)	7.85E-05	7.85E-05	7.85E-05	7.85E-05
PSI	86	7	1000	9
scfh (air)	5.18	0.42	60.24	0.54
CF	0.64	0.56	0.53	0.54
scfh (gas)	3.31	0.24	31.78	0.29
Grams/hr	271.93	25.27	3830.75	33.96
Pounds/min	9.98E-03	9.28E-04	1.41E-01	1.25E-03

Table notes: scfh= standard cubic feet per hour

3.0 OFF-SITE CONSEQUENCES

The ALOHA CAMEO program was used to conduct a screening level evaluation of potential impacts to the ITR Study Area given a release of the hazardous substance from its primary containment. Releases were initially modeled using worst-case meteorology (stable conditions) to estimate worst-case concentrations downwind. In general, stable atmospheric conditions represent calm dark days or calm night-time conditions. During stable atmospheric conditions and low wind speed, the vertical and horizontal dispersivity of a release is minimized resulting in higher predicted downwind concentrations. In addition, for a selected release, reasonable atmospheric and wind speed (normal) conditions were also used to estimate downwind impacts to provide a comparison to the worst-case, least likely results.

Worst-case conditions assumed rural dispersion coefficients, a wind speed of 1.5 meters per second (m/s), atmospheric stability class F (stable), and an outside temperature of 60 degrees Fahrenheit. For selected releases, in addition to the worst-case, normal (more likely) atmospheric conditions were assumed. These conditions also included rural dispersion coefficients, a wind speed of 3.5 m/s, atmospheric stability class D (unstable), and an outside temperature of 60 degrees Fahrenheit.

Three selected compounds (chlorine trifluoride, silicon tetrafluoride, and dichlorosilane), may react with moisture in air to produce heat and hydrogen chloride or hydrogen fluoride. Since the ALOHA does not account for chemical reactivity, modeling conservatively assumes that these substances are non-reactive.

For the screening level evaluation, releases were initially evaluated if they could produce a level of concern (LOC) at the selected facility's exterior. The criteria to establish or define a "level of concern" to human health are drawn from the American Industrial Hygiene Association's (AIHA) Emergency Response Guidelines (ERPGs), and the National Institute of Occupational Safety and Health (NIOSH) Immediately Dangerous to Life and Health Concentrations (IDLHs). ERPGs and IDLH are further defined below.

3.1 ERPG and IDLH Definitions

In the development of ERPGs, the AIHA recognized the variability of human responses over a wide range of concentrations and, therefore, cautions that ERPGs should not be expected to protect everyone, but should be applicable to most individuals in the general public. The AIHA also recognizes that in all populations, there are hypersensitive individuals who will show adverse responses at exposure concentrations far below levels at which most individuals normally would respond. ERPGs are defined below:

ERPG-1: The ERPG exposure level 1 is defined as the maximum airborne concentration that nearly all individuals could be exposed to for up to 1 hour without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.

ERPG-2: The ERPG exposure level 2 is defined as the maximum airborne concentration that nearly all individuals could be exposed to for up to 1 hour without experiencing or developing irreversible or other serious side effects or symptoms that could impair an individual's ability to take protective action.

ERPG-3: The ERPG exposure level 3 is defined as the maximum airborne concentration that nearly all individuals could be exposed to for up to 1 hour without experiencing or developing life-threatening health effects.

IDLH: Immediately Dangerous to Life and Health (IDLH) concentrations represent maximum concentrations from which one could escape within 30 minutes without a respirator and without experiencing an escape impairing or irreversible health effects. IDLHs are assumed to be applicable to healthy adult workers in the work place and do not take into account exposure of more sensitive individuals.

With respect to agency use of concentration criteria, the Bay Area Air Quality Management District (BAAQMD) recommends the use of Emergency Response Planning Guidelines exposure level 2 (ERPG-2) as criteria for evaluating significant impacts. In addition, the U.S. EPA generally defines "distance to toxic endpoint" in the Risk Management Program (RMP) for off-site consequent analysis as the ERPG-2 concentration. In the absence of ERPG guidelines, the U.S. EPA has recommended one-tenth of the IDLH concentrations for planning purposes.

ERPGs are established for chlorine and chlorine trifluoride but not for silicon tetrafluoride or dichlorosilane. In the absence of an ERPG concentration, this appraisal assumes that the LOC is represented by the 1/10th IDLH concentration.

3.1 Results

The results of this screening level appraisal are summarized in table 3 below.

Table 3. Dispersion Modeling Results

Release (atmospheric conditions)	LOC (Criteria)	Approximate Distance to LOC
Chlorine (worst-case)	3 ppm (ERPG-2)	141 feet
Chlorine (normal)	3 ppm (ERPG-2)	42 feet
Chlorine Trifluoride (worst-case)	1 ppm (ERPG-2)	81 feet
Silicon Tetrafluoride (worst-case)	2 ppm (1/10 th IDLH)	681 feet
Silicon Tetrafluoride (normal)	2 ppm (1/10 th IDLH)	162 feet
Dichlorosilane (worst-case)	10 ppm (1/10 th IDLH)	39 feet

The results of this screening level appraisal indicate that silicon tetrafluoride could have significant off-site consequences if released under the conditions assumed. The primary driver for the downwind distance is related to the release rate estimate. Since this gas is stored at elevated pressures (Table 1), the release rate is far greater than the other gases (Table 2). However, a release of this compound may result in reduced downwind concentrations if there was a significant reaction with water vapor in the air. Reaction with water vapor produces heat, which could cause buoyant plume rise, resulting in lower downwind ground level concentrations. The reaction by product is expected to be hydrogen fluoride that has an ERPG-2 concentration of 20 ppm. Thus, this screening appraisal likely over-estimates risk due to chemical reactivity.

3.1 Off-Site Mitigation Measures

In our opinion, local, state and federal laws, regulations and ordinances require sufficient engineering controls to help prevent chemical releases, and in the event of a release to help protect human health and the environment. A number of local, state and federal regulations address the prevention of accidental releases of chemicals that can affect human health. The implementation and enforcement of these regulations regarding the use, storage, transport and disposal of hazardous materials will reduce the potential for impacts to existing and future residents and school children. Based on our limited knowledge of chemical use in this area of Sunnyvale, off-site mitigation measures do not appear required at this time as evidenced by the co-existing residential and industrial communities.

If future uses on redeveloped parcels were to involve the use, storage, transport or disposal of hazardous materials, the site operator will be required to comply with federal, state, and local requirements for managing hazardous materials. Depending on the type and quantity of hazardous materials, these requirements could include the preparation of, implementation of, and training in the plan, programs, and permits described above.

However, if a higher degree of comfort is desired and off-site mitigation measures were to be developed, they must reflect the fact that a release of chemical agent will affect different areas in different ways and at different times. Areas near the point of

release are likely to experience relatively high concentrations of a chemical very quickly, while areas farther away are likely to experience lower chemical concentrations after a longer period of time. Consequently, there are differences in the mitigation measures that are appropriate for the different areas and in the time available to implement those actions. This section describes a method of dealing with these area-based differences in the mitigation planning phase.

In general, the likelihood of being exposed to a chemical agent from a release decreases as the distance from the point of release increases. In addition, the extent of exposure also decreases with distance as the concentration of the chemical becomes lower. Greater distance also means that more time is available to implement protective actions. Because of these factors, the extent and type of emergency planning require changes as the distance from the source of a potential release increases. Since it is not practical to develop emergency response plans that vary continuously with distance, it is necessary to establish zones to differentiate appropriate levels of response.

We recommend developing three concentric zones. This concept reflects the differing response requirements associated with a fast-breaking chemical event with limited time for warning and response. The innermost planning zone is the immediate response zone (IRZ), the middle zone is the protective action zone (PAZ), and the outermost zone is the precautionary zone (PZ). Due to the nature of the surrounding terrain or the composition of the chemical, application of this concept will produce substantially different zones at different locations.

Prompt and effective response is most critical in the IRZ because of the potentially limited warning and response time available. This area would be the first affected by an accidental release of a chemical and would likely receive the heaviest concentrations. This zone encompasses an area requiring less than one-hour response time when affected by a chemical release under "typical" weather conditions. For these reasons, emergency response plans developed for the IRZ must provide for the most rapid and effective protective actions possible.

The full range of appropriate and available protective action options and response mechanisms should be considered for the IRZ. Public protective actions must be selected primarily on the basis of the affected individuals' safety and ability to implement various alternative actions. Warning systems and sheltering with some form of enhancement may be appropriate if little time is available to implement protection. In this instance, time may not be available to evacuate even a part of the IRZ. The suitability of sheltering, however, depends on a number of other factors including the type(s) and concentration(s) of chemical(s); pre-emergency or expedient measures taken to enhance various buildings' capacity to inhibit agent infiltration; the ability to communicate instructions to the public in a timely and effective fashion; and the accuracy and speed with which estimates can be made on chemical's direction, speed, and concentration.

The PAZ is an area that extends beyond the IRZ to that area where public protective actions may still be necessary in case of an accidental release of chemical agent, but where the available warning and response time is such that most people could evacuate. The primary emergency response is evacuation because it is anticipated that there will be sufficient time to permit an orderly and complete evacuation.

However, other responses (e.g., sheltering) may be appropriate for institutions and special populations that could not evacuate within the available time.

The PZ is the outermost EPZ and extends from the PAZ outer boundary to a distance where the risk of adverse impacts to humans is negligible. This distance, which may vary substantially based upon the circumstances of an event, must be determined for each chemical event. Because of the substantial warning and response time available for implementation of response actions in the PZ, detailed local emergency planning is not required, although consequence management planning may be appropriate. The boundaries of this zone will vary and need not be set prior to an actual chemical event.

UNCERTAINTY/LIMITATIONS

The primary uncertainties associated with this assessment included the selection of chemicals for evaluation, release rate assumptions, and atmospheric conditions during the release.

With respect to chemical selection, chemicals were provided by the City of Sunnyvale and were assumed to be selected based on volumes, recognized toxicity, and were judged by Sunnyvale to be representative of the potential release risks posed by facilities in the vicinity.

Release rate estimates for gaseous substances were estimated based on RFO sizes and pressure parameters provided by Sunnyvale. Although actual leakage through a damaged valve is uncertain, this assessment assumed that flow through installed RFO devices provided a reasonable proxy for leakage through a hypothetically damaged valve. Release rates through restrictive orifices underestimate worst-case release rates assumed by U.S. EPA.

In addition, atmospheric conditions considered worst-case conditions and in some cases reasonable conditions. The worst-case conditions modeled generally represent night-time or dark cloudy conditions during periods of calm when vertical and horizontal dispersion of the contaminant plume is minimized. These conditions generally occur at a very low percentage of the time over any yearly time period. In addition, the model assumed no moisture was present in the atmosphere, an unrealistic condition.

Finally, all releases assumed that the Project was located plume centerline, downwind, at the time of the release. Wind speed and wind direction vary over time. Prevailing winds are generally out of the northwest.

This report was prepared for the sole use of David J. Powers & Associates. We make no warranty, expressed or implied, except that our services have been performed in accordance with environmental principles generally accepted at this time and location.

Sincerely,

TRC LOWNEY

Kurt M. Soenen, P.E.
Senior Project Engineer

Dan Hernandez, C.I.H.
Senior Toxicologist

Ron L. Helm, R.E.A. II, C.E.G.
Senior Principal Geologist

RLH:KMS:DH:ch

Copies: Addressee (via e-mail)

Attachments: Model Output

MV, 858-47B letter.DOC

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